

PLAINTIFF'S
EXHIBIT

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NSC-360

PROCEEDINGS
OF THE
**National Safety
Council**

TWELFTH ANNUAL
SAFETY CONGRESS

Held at the
Statler Hotel, Buffalo, N. Y.
October 1 to 5
1923

National Safety Council

168 North Michigan Avenue, Chicago

HONORARY MEMBERS

. Association of Iron and Steel Electrical Engineers
Elbert H. Gary, Robert W. Campbell, Ralph C. Richards

OFFICERS (1923-1924)

L. A. De Blois, President.
C. B. Auel, Vice-President in charge of General Activities.
Marcus A. Dow, Vice-President in charge of Public Safety.
George T. Fonda, Vice-President in charge of Local Councils.
H. A. Reninger, Vice-President in charge of Industrial Safety.
David Van Schaack, Vice-President in charge of Public Relations.
Homer E. Niesz, Vice-President and Treasurer.
W. H. Cameron, Managing Director.

EXECUTIVE COMMITTEE (1923-1924)

The Officers and

James P. Barnes, Louisville Railway Company.
Frank N. Fisher, Memphis Motor Car Company.
Gen. Alfred F. Foote, Commissioner of Public Safety of Massachusetts.
Frank Frey, Jr., Geuder, Paeschke & Frey Company.
R. R. Hadsell, New York State Railways.
R. Dawson Hall, McGraw Hill Publishing Company.
Julien H. Harvey, Kansas City Safety Council.
Robert T. Herdegen, Dominion Forge and Stamping Company.
Col. C. L. Hinkle, Chicago, Great Western Railroad Company.
Walter G. King, American Optical Company.
F. M. Metcalfe, Northern Pacific Railway Company.
H. W. Moses, Edison Electric Illuminating Company.
S. C. Mumford, Detroit Edison Company.
C. E. Pettibone, American Mutual Liability Insurance Company.
Oliver T. Remmers, Anheuser Busch, Inc.
A. D. Risteen, Travelers Insurance Company.
H. A. Rowe, Delaware, Lackawanna and Western Railroad Company.
R. B. Stoeckel, Commissioner of Motor Vehicles of Connecticut.
John H. Truett, United Railways and Electric Company.
F. P. Walker, General Necessities Corporation.
A. L. Watson, Hooker Electrochemical Company.
A. W. Whitney, National Bureau of Casualty and Surety Underwriters.
A. H. Young, International Harvester Company.

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The National Safety Council

What It Is

A BODY OF MEN determined to prevent accidents. The members are employers in every industry—including workshops, public utilities and mines; schools and colleges; government officials and other individuals interested in industrial and public safety. The National Safety Council is a service association—not for profit. It is a means of exchanging and pooling information upon practical safety methods. Over one million dollars have been spent in accumulating every scrap of accident-prevention experience, and the Council has printed and distributed over 3,000 different pictorial bulletins visualizing the causes of accidents. The monthly magazine, the Annual Congress Proceedings, the specialized pamphlets—are all sent automatically to members, and are summaries of the experiences and information contributed by all, for all.

Organization

The 4,000 members (employing 6,000,000 workers) elect Directors; the Directors elect an Executive Committee, and the Executive Committee elects the unpaid and paid officers. Over 1,000 persons serve on the non-paid committees. The officers and Executive Committee have met monthly for more than ten years to determine the policies of the Association. Many thousands of dollars are contributed through the time and traveling expenses of these committees, not shown in the Treasurer's Annual Report. The headquarters' staff consists of forty-four persons, including technicians of high standing, who carry out the policies laid down by the governing committees.

The membership is subdivided into twenty-four Sections (such as Metals, Woodworking, Steam Railroad, Mining, Construction, etc.), and the sectional activities are directed by voluntary officers and committeemen. Local councils intensify the propaganda in more than fifty leading cities.

National Safety Council

Annual Meeting of Members

Buffalo, New York

October 1, 1923

CHAIRMAN, MARCUS A. DOW, President, National Safety Council

PRESIDENT DOW: We will open the Twelfth Annual Congress of the National Safety Council with an invocation by the Reverend Arthur H. Gordon, of Buffalo.

DR. GORDON: O Lord, our God, Thou art over all and Thy tender mercies are over all Thy works. We bless Thee for the fidelity of Thy dealings with us and for the constancy of Thy preserving care. As we go about our accustomed tasks Thou dost give Thine angels charge over us to keep us in all our ways. As we lay ourselves down in sleep we awake because Thou, Lord, dost sustain us. Help us, we pray Thee, to esteem ourselves highly in Thy sight and for Thy sake. May Thy providence over us teach us prudence for ourselves. Help us to revere our bodies as the temples of Thy spirit and as the instruments through which we worship and serve Thee, and help us to keep them from anything that defiles or disables. Not a sparrow falls to the ground without our Father's knowledge, and we are of much more value than many sparrows. As we care for ourselves, grant, we pray Thee, that we may have solicitude for our fellows who are made in Thine image.

God forbid that we should count commercial gain above human good or should expose others to danger in order that we ourselves may be advantaged. Rather help us to bear one another's burdens and take pains ourselves for the security of others and thus fulfill the law of Christ.

We ask Thy special blessing upon the Congress which is being held here in this city during this coming week. It is not Thy will, our Father, that one of these little ones should perish. Grant, we pray, that they may be prospered here as they plan and work for the realization of this, Thy will on earth as it is in Heaven. Grant that as the result of these conferences there may be stirred up the sluggish sentiment of this community and there may be enlisted cooperation from all quarters, which shall make not only this city and this state, but all this nation and the world safe for men and women and children. Amen.

ADDRESS OF WELCOME

MAYOR FRANK X. SCHWAB

I am glad to see that this country is coming into its own. Up to ten or fifteen years ago we thought more of the almighty dollar than we did of humanity, but it seems today we are working toward that other issue of humanity.

We are here today to bring about better conditions, we are here to tell the man or the woman who is a little bit careless that they must be more careful. The people who are arrested for accidents are not the type of people who want to kill others; it is just a matter of being too greedy. We have too much business, too much money at stake and we forget humanity. Humanity should be our watchword. I can see by the general conditions of the hospitals, by the conditions existing generally otherwise, by the Safety Council, by you ladies and gentlemen coming here, that we are thinking more of humanity than we were some years ago.

In conclusion I want to express the well wishes of all the people of Buffalo. Ask and you shall receive. We are at your service.

ADDRESS OF MR. A. L. KINSEY

We in Buffalo are building big things for our city, and we want to hold the best and the largest Safety Congress ever held up to this issue.

I want to say on behalf of the committee that we are deeply appreciative of the work that the National Safety Council has given us. Without them we would have been lost. Mr. Smith has been with us for practically four weeks. Mr. Cameron, Mr. Dow, and every one else have helped tremendously. The Committee does not want to take any credit except that which is due them for having done only their share with the National Safety Council.

Up to last year safety in Buffalo was carried on individually. That is, each plant had its own program; the city had a program, but there was no coordination of all of those programs. The Chamber of Commerce felt that they could go ahead and coordinate all this work. I think that they have done that most successfully, and the fact that they have done it successfully is due to one man, and that man is Sydney Coleman. He has done the job one hundred per cent since he has been with the Chamber of Commerce.

If every city had the cooperation of the city administration in their safety work, they would get along in wonderful shape. We certainly have had it here. When we asked for an appropriation to help this Congress, we got it; we got every cent we asked for. We have got everything we asked in the way of traffic work. The mayor and his committee and his councilmen have delivered one hundred per cent.

In view of the fact that we are only a year old in organized safety, we feel that we are greatly complimented by your Congress coming here, and we hope that in coming here you will not be disappointed, that you will go away having learned something or having gained a message or a number of messages.

I want to thank you for coming to Buffalo. We want to do everything we can to make your stay pleasant and profitable.

APPOINTMENT OF TELLERS

PRESIDENT DOW: The executive committee, having appointed three inspectors of election at its meeting yesterday, the chair will now appoint these men as tellers of this meeting:

Mr. Adam H. Lintz, Chairman

Mr. A. S. Phelps

Mr. Girard C. Varnum

ADDRESS OF PRESIDENT

MARCUS A. DOW

Let me begin by reminding you that for the twelfth time we are gathered together in Annual Congress to exchange greetings and to rededicate our lives to the cause of safety. For another year we have striven to remove from our public and industrial life the stigma of avoidable accidents, to strengthen the bonds which unite the employer, the employee and the community, and to increase human happiness by preserving and prolonging life.

As pioneers and investigators in a new realm of social and industrial science and as fellow-members of the Safety Fraternity, we are gathered here at our annual reunion. This, my friends, is our yearly opportunity for the personal expression of goodfellowship and for the repledging of our honor and our lives to the Safety Crusade and to the Council of which we are so proud.

Our association is one of organized strength, of organized power and will. Three thousand, four hundred members pulling together in the same direction will uproot the mightiest oak of prejudice and lethargy. The National Safety Council is welding public opinion upon the accident problem. It is an army 3,400 strong of the nation's most progressive industries, railroads, insurance companies and individuals who have declared their determination to save human lives from accidents, expressing their intention to create, if you please, a public sentiment for the highest standards and for the finest relations in business and domestic concern.

When the members of such an organization, working together steadfastly and loyally for eleven years to promote a common cause and through all the fluctuations of daily life, including the stress of war and its inevitable aftermath, continue their allegiance to this common source of inspiration as have the members of this Council, I have confidence that the permanence of the safety idea in America is assured.

Associations are judged by their achievements. Leadership may focus attention, but strength and continuity depend upon the loyalty of the members to their pledges and principles, and the members of the National Safety Council can congratulate themselves that their eleven years of wise effort have created the most powerful single progressive and stable safety organization in the world.

The point of our arrow of purpose is to save human lives, and the consummation of our eleven years of effort has been the realization that each member can save human lives and can prevent accidents with attendant human suffering if he will but do the things that we together have learned will bring about the maximum of safety. Our association is more than a business men's club. Its economic objectives, true, are worthy of the highest praise, but as the beacon of our endeavors let me remind you that we are banded together for the highest form of human service, to work and to strive that the lives of others may be saved.

HUMAN LIFE IS FORGOTTEN IN RUSH

In this truly remarkable age when the development of mechanical means of production and transportation has reached a stage not dreamed of a century ago, when we have learned to value so many things that were unknown to our forefathers, we have been somewhat careless of the thing of real fundamental value that is back of it all. As we hurry through our crowded streets, as we hurry from our great prolific factories, as we speed from city to city on errands of business or of pleasure, we should keep constantly in mind that there is one great, significant, intrinsic thing that gives value to everything, that makes the street worth while, that makes the factory worth while, that makes our institutions worth while, our cities worth while, the nation worth while; that thing is human life. It is the life of our men, of our women, our boys and our girls that gives value to every other desirable thing in the world. The National Safety Council is dedicated to the conservation of this thing of fundamental value in the world. To accomplish its purpose it must have members. To increase its usefulness it must have more members. The original five members of this Council gave their pledge to add to the membership of the organization, and there are few finer examples of perseverance than the growth in membership of the National Safety Council, made possible through that same membership pledge cheerfully assumed by each member.

There is only one right and economic way to double the number of our association members, yes, even to treble it, and that is for every member to be loyal to safety, loyal to himself, loyal to his associates, and to induce his friends and neighbors who have similar safety problems to become members.

A double membership would mean double service and double influence in the progress of our nation toward safer working conditions, safer community and living conditions.

This annual meeting, my friends, is the Council's New Year's Day. Now is the time for you to make your pledge that you will perform your duty to yourselves, to your associates, to your Council, and to your country by bringing in at least one new member during the coming year. The really big-hearted member would not stop at one. Why not try to make it even one a month? The Safety Council is ready at all times to send samples of our literature service and to supplement our own efforts.

As good business men we are, of course, interested in the status of our financial condition at the end of the fiscal year. The reports of my fellow officers will show a substantial increase in the number of members, in the income for the year, and a marked improvement in our financial condition. The determination to set aside seven per cent of the monthly collections from dues as a reserve fund has been continued, and that reserve has been invested in securities. As the income has increased to an extent that seemed to warrant it, new activities and a more helpful service have been undertaken. Now with an increased income, other activities and a still more helpful service could be developed but, as you well know, all of the activities for public and industrial safety of this organization must be paid for out of the income from dues.

The reports of the vice presidents will give you in detail their activities, their supervision and direction of the principal standardized activities of the Council during the year. There have been, however, some particularly important activities that are significant, to my mind, from the standpoint of realizing the Council's objectives, such as, for instance, the district meetings that have been held of the members and others under the auspices of the Engineering and Mining Sections, and these successful conferences really point the way to other similar meetings of trade groups during the coming year.

The monetary assistance of the National Bureau of Casualty and Surety Underwriters referred to at some length by President Young at the Detroit Congress has made it possible for us to intensify the Council's assistance to the public school in making safety a part of daily curriculum, and the significant exhibit that has been prepared for your inspection at this Congress and the safety play "Adventure" which will be called to your attention more in detail later on this morning are particularly worthy of your attention.

ACTIVITIES OF LOCAL COUNCILS

There have been so many activities of importance in your Council's development during the past year that I am going to ask your indulgence for a few moments while I read this report, and I think you will agree with me after I have finished that the Council has developed wonderfully and has had a most successful year. There has never been so many safety activities in the large communities as this year, as evidenced by the establishment of ten new community safety organizations, making a total of twenty-eight now directed by salaried managers and a staff, and, of course, sponsored and led by hundreds of voluntary officers and committeemen.

The production of three new safety films was undertaken this year by your Council, and you will have the privilege of witnessing the first showing of one of these films following the addresses of this afternoon's session.

Four new trade sections have been organized. Many new publications have been prepared, printed and distributed. Two field secretaries have given valiant service to many communities. Medals have been awarded to the winning teams in first aid contests. A Middle Western States Motor Vehicle Conference was brought about and organized. The local council managers have met quarterly under the auspices of your national organization, and there are many activities that you are familiar with.

The National Safety News is now considered to be the premier safety publication of the United States. No other institution or agency is preparing 500 new and original safety bulletins each year and distributing them in millions of copies.

The safe practices articles are accepted as the most practical standard for applying safety yet produced. Literally, tons of information are being sent out on request from the library and information bureau. In the several divisions of the Council's headquarters office, every unit of knowledge passes into the stage of positive or scientific.

Any member of the trend of safety development in the United States must agree that the scientific stage is reached. Correspondence has been maintained with every known safety agency. There has been an interchange of national and international ideas and publications, and every inquirer, whether a member of the Council or not, has received some assistance in response to his manifested interest in safety.

Much praise is due to the officers, the committeemen and the members responsible for the success of our local councils. The activities of the sections and the special committees and the reports from local council officers will be included in the Annual Congress report, and you will read with interest and gratitude the reports of the sectional officers made during the progress of this Congress.

WEDGING IN PROCESS COUNTS

Next to the commendable services of members and the intensive community safety work, the growing interest in industrial trade groups in safety deserves recognition. It is this wedging in process that counts. The maximum accomplishments, I think, will be attained when every community becomes alert to the safety of the citizen and when every trade organization makes certain that every member within its jurisdiction is protected by the best known practices in shop operation, and when these two divisions of your Council's activities are fully and completely worked out, our national safety problems will be solved.

It is pleasant to remind you again of the Engineering Standards Committee and the progress made during the year in the preparation of many safety codes.

The American Association of Industrial Physicians and Surgeons and the New York State Labor Department, synchronizing their annual meetings with our Congress here in Buffalo this year are worthy of your special consideration.

The federal and state governmental safety agencies have intensified their efforts by increasing their safety services. The insurance companies, perhaps, are spending more money than all the other agencies put together for encouraging improved working conditions in our industries, and we are mindful of the example which our Canadian and British friends are showing us by their steady advance in national and association safety work.

I should like here to make special mention of the enterprise and organization of the steam railroads of America in contributing significantly toward the reduction of accidents through the Safety Section of the American Railway Association. This Section, through its various committees, my friends, has developed a real worth-while safety service. It has conducted two annual conventions and has conducted two nationwide crusades for the lessening of accidents at grade crossings—a most commendable and praiseworthy safety service.

I should like to remind you, again, that all of the money paid out through your treasury does not represent the entire cost of conducting the affairs of your association. For instance, during the past twelve years your executive committee has met monthly and the out-of-town members of that committee have always paid their own traveling expenses and have contributed without cost to the Council their time in attending these meetings. Other committees have been equally free and generous in their contribution to the Council, and while the thanks of the members are due these leaders for their service and their contribution to safety, yet I venture to say that everyone of these voluntary committeemen finds his greatest reward in the realization that human lives are being saved and human suffering is being prevented by the work that he is doing.

PRAISES COUNCIL STAFF

I should be neglectful, indeed, if I failed to say a word or two in commendation of the splendid and efficient service that has been rendered by the paid staff of your Council during the past year, all of whom have worked zealously and enthusiastically uncounted hours to carry out your ideas, to develop new ideas for you, and to develop a worthy safety service. Let me say that no association, no organization, no business enterprise in this country ever had a more loyal and efficient staff of workers than the National Safety Council headed by our indefatigable and enthusiastic managing director, old reliable William H. Cameron.

Now my friends, as I said to you in the beginning, the President's annual report must necessarily be largely in the nature of a report of the activities of the Council service during the past year. I feel that this is going to be the biggest, the most enthusiastic and perhaps the

finest Congress we have ever held, due in a measure to the splendid cooperation of the local community, that is true, but due in a still larger measure to the growing interest in the safety movement and in life conservation throughout the United States, as is evidenced by the large registration here at our Congress meeting this morning.

I hope that the sessions of this Congress will be an inspiration to every one of you to go forth to your homes and to perform that kind of safety service that springs from a service of the heart, a service that will mean that you will continue by your own personal effort, by your day-to-day, hour-by-hour accident prevention work performed conscientiously in your own communities, a thing which will redound in great benefit to humanity during the coming year.

I believe that the growing interest in our National Safety Council's Annual Congress, as evidenced by this great gathering here today, augurs well for the future of safety in America.

The next item on our program of business this morning is the reading and disposal of the minutes of the last meeting. As these minutes have been printed, a motion will be in order, I think, to dispense with their reading.

Mr. Thos. Carrow (Pennsylvania R. R., Philadelphia): I move that the reading of the minutes be dispensed with.

The motion was regularly seconded and carried.

ANNUAL REPORT OF MANAGING DIRECTOR

W. H. CAMERON

The National Safety News has been improved in quality and in the number of special articles; there has been an increase in the total circulation and in the number of extra copies ordered by members for their foremen and superintendents. The production of a magazine of the present size and quality at so low a cost is made possible only through the remarkable generosity of members in contributing special articles, photographs, information on special hazards and safeguards, and data for symposiums. Few if any magazines have the services of so large a staff of able, energetic, volunteer contributors.

The Workmen's Bulletins have been continued at the rate of 36 per month and have been improved in quality. More time and money has been spent upon the bulletins than ever before, and each month one of the large-sized bulletins has been painted especially for the purpose by a well-known artist. A total of 1,250,000 extra bulletins has been ordered by members during the year.

The Safe Practices Pamphlets have appeared bi-monthly under the supervision of Mr. R. J. Young and with the invaluable help of the Conference Committee of 75 safety engineers. Several of the earlier pamphlets have been revised and reprinted. This "safety encyclopaedia" now numbers 56 pamphlets in the general series, and 8 sectional, to which

should be added three valuable "Data Sheets" issued by the Chemical Section during the year. An alphabetical index to the contents of all the Safe Practices pamphlets has been prepared for distribution to members desiring it.

The Information Bureau has answered 4,554 requests for information—nearly double the number received during the preceding year—involving the distribution of over 50,000 pieces of information, including clippings, pamphlets, books, photographs, blueprints, bulletins, etc.

Films and Slides have been loaned to members in increasing quantities. The two albums of photographic reproductions of the entire slide collection (now numbering more than 1,100) are in constant circulation among members for the selection of slides for their specific purposes. The film library has been kept up to date—and, most gratifying of all, funds have been raised for the production of three new National Safety Council films to cost \$20,000 and the first of these will be exhibited for the first time at the Buffalo Congress.

The Safety Calendar has been regarded by members as a real item of service, as shown by the fact that 300,000 copies of the 1923 Calendar were distributed. Four leading artists have prepared thirteen remarkably fine paintings for the 1924 Calendar.

The 1922 Congress was considered the most successful in the Council's history. The Proceedings of this Eleventh Congress, after the most rigorous editing, contains over a thousand pages of general and special safety information with complete alphabetical index.

National Safety Codes, looking toward the elimination of conflicting requirements and the accurate determination of practical standards, have received greater attention than ever before. Under the Council's sponsorship the Code on Power Presses has been completed, approved by the American Engineering Standards Committee, and widely distributed; the Codes on Construction Work and Paper and Pulp Mills will have their final hearings at the Congress; substantial progress has been made on the Code of Colors for Traffic Signals and the Textile Code; and the first draft of a new Forging Code has been prepared. The three last mentioned have been in joint sponsorship with other organizations. In addition, the Council has been represented by various members on some 34 committees formulating other standard codes; Mr. A. W. Whitney, long a member of our Executive Committee, has been Chairman of the American Engineering Standards Committee, and our Chief Engineer has been Chairman of the Safety Code Correlating Committee.

The Plant Publications of Council members have been given a special service including original safety cartoons and reproductions of the 1923 Calendar pictures with accompanying stories. Other Special material and assistance have been given to members publishing plant magazines or contemplating the establishment of a publication.

The Industrial Sections have been more active, on the whole, than ever before. All of the sections have held executive committee meetings during the year for the planning of their intensive service to their members

and several have conducted energetic membership campaigns. Many of the sectional committees have performed invaluable service to their fellow members by furnishing photographs for bulletins, conforming to the present high standard of excellence.

The Engineering Section held three successful meetings during the year and its research committees are doing valuable work on fundamental safety problems. Many new members have been added to this section.

A New Marine Section and a new Ice and Refrigeration Section have been organized. This raises the number of industrial sections to 18, plus Health, Education, Engineering and Public Safety and groups interested in Plant Publications and Employees Benefit Associations. Of particular significance was the holding of two highly successful regional conferences of the Mining Section in Butte, Montana, and Globe, Arizona.

PUBLIC SAFETY

While most of the work for safety on the streets and in the homes has been directed toward the formation and upbuilding of community safety organizations, the Council has also increasingly fulfilled its obligation as national leader of the whole Safety Movement. The public accident report forms prepared by the Public Safety Section have been widely distributed. Several radio messages, including a special Fourth of July warning, have been broadcasted from a number of stations. A special report on radio hazards has been prepared. The National Code on Colors for Traffic Signals, already mentioned, is of far-reaching importance for public safety and is a step toward uniformity in traffic regulations in general. Another step in the same direction was the holding, under Council auspices, of the first conference of motor vehicle authorities of the middle western states, resulting in a permanent organization of these officials. The Public Utilities, Electric Railway, Steam Railroad and Taxicab and Delivery Sections have cooperated in the development of the public safety program and close contact with them has been maintained by the Public Safety Division of the headquarters staff.

The Education Section has been much more active than ever before, through the services of a full-time assistant secretary, made possible through the generous assistance of the National Bureau of Casualty and Surety Underwriters, which also helped to finance the field secretarial service to local councils mentioned below. The Education Section has made contact with literally hundreds of public school systems throughout the country and in a large number of these communities safety education has been put on a sound and practical basis. Six demonstration centers have been a valuable aid to this work.

Our Publicity Service in the public safety field has been considerably developed. Series of safety lessons and daily safety messages have been sent to and used by hundreds of newspapers. Dispatches and feature stories have been sent out in cooperation with national news agencies. Material has also been sent to the newspapers. Much special material and assistance have been given to local councils and members, for local publicity campaigns.

LOCAL COUNCILS

Our intimate contact with and service to the Local Councils has been greatly developed. The preparation of a series of local council organization and activities has been begun and the numbers on "Financing," "Organization and Activities," and "Foremen's and Safety Supervisors' Schools" have been prepared. A monthly news letter of specific information has been sent to the local council officers, with valuable enclosures. A pamphlet on the "Trend of Public Accidents" was printed and distributed. The quarterly conferences of local council secretary-managers and headquarters' officers have been widely attended. A set of "Elevator Safety Lessons" has been prepared and printed for local council use. Ten new local councils have been organized. Two new field secretaries have given all of their time to the organization and service of the locals. Extensive correspondence has been maintained both with the existing locals and with communities desiring to organize for safety. State and municipal authorities have been furnished with copies of the Council's public safety material and have been inspired to greater activity in accident prevention work.

EXTERNAL RELATIONS

Cordial cooperation has been maintained with other institutions interested in Safety, such as the American Museum of Safety, the United States Chamber of Commerce, the Boy Scouts, the Canadian Safety Council, the Ontario Safety League, the American Association of Industrial Physicians and Surgeons, the Safety Section of the American Railway Association, the Safety Bureaus of the insurance companies, and state and federal government departments, as well as the American Engineering Standards Committee and the National Bureau of Casualty and Surety Underwriters already mentioned.

Safety Exhibits have been furnished on request for a number of trade association and other meetings.

Extensive General Publicity, in addition to the public safety items already mentioned, has been secured and a large number of special articles has been furnished to and used by trade magazines and other publications.

STAFF

To enumerate the real "staff" of the National Safety Council requires almost a membership roll of the organization, so large is the number of members who have contributed to the NATIONAL SAFETY NEWS, the bulletin service, the Safe Practices pamphlets, the upbuilding and service of the various sections, the Annual Congress, the film and slide collection, and all the committees and activities, both national and local.

In addition to Carl L. Smith and W. R. Rasmussen, Field Secretaries, and Mary Noel Arrowsmith, Assistant Secretary of the Education Section, the headquarters staff now comprises 42 persons, including:

W. H. Cameron, Managing Director and Secretary.

Twelfth Safety Congress

Sidney J. Williams, Chief Engineer (in charge of Industrial Division and Publications).

Fred M. Rosseland, Chief of Public Safety Division (including Local Councils).

W. Dean Keefer, Chief of Business Division.

George Earl Wallis, Editor and Director of Publicity.

R. T. Solensten, Supervisor of Bulletins.

John M. Sandel, Safety Engineer.

C. T. Fish, Associate Editor.

Mary B. Day, Librarian.

Mary M. Wells, Assistant Librarian.

M. Mollan, Chief Clerk.

REPORT OF FINANCE COMMITTEE

HOMER E. NIESZ, CHAIRMAN

An analysis of the report of the Treasurer submitted herewith shows a substantial increase in both gross and net earnings during the fiscal year ending July 31, 1923.

The total gross revenue is \$261,644.88, an increase over the previous year of \$55,648.56.

The amount of revenue from memberships is \$164,943.56 which is an increase of \$12,603.35 over the previous year.

A very substantial source of profit was the sale of calendars of which over 300,000 were sold, providing a net revenue of \$25,451.04, or an increase from this source over the previous year of \$18,582.33.

There is a gross increase in expenses of \$37,906.94, which is due to two principle causes; the setting aside in reserve for future members of \$11,629.18 in cash and the increase in expenses of operation due to the addition of one field man paid for from the funds of the Council; increase in the number of employees and some salary increases to the office and staff, which resulted in increased facilities and improved service to members.

The net earnings transferred to the surplus account amount to \$11,901.97, as compared with \$4,662.78 for the previous year.

There has also been set aside out of the earnings during the year a special fund as a reserve for future service to members amounting to \$11,629.18, as compared with \$1,000 transferred to this account during the previous year. This fund is obtained by taking seven per cent of our gross revenue from membership fees, is deposited in a separate bank account and is periodically invested in high grade bonds. There is now on hand a total of \$12,629.18 in cash or liquid securities.

The resources and income of the Council are increasing in a very satisfactory manner and the expenses are being maintained at a level which is conservative but subject to increase as our income may warrant, each additional item of cost representing greater service rendered by the Council.

The detailed report is as follows:

ASSETS				
	As at July 31, 1923	As at July 31, 1922	Increase	Decrease
Current Assets:				
Cash	\$14,265.28	\$ 6,120.37	\$ 8,144.91	\$
Investment Securities	9,986.25		9,986.25	
Accts. and Notes Rec.	11,882.49	15,860.63		3,978.14
Advances to Staff	660.00	286.03	373.97	
Inventory of Supplies	3,283.91	3,384.60		100.69
Deposit with Postmaster	464.54	484.05		19.51
			<u>\$18,505.13</u>	<u>\$4,098.34</u>
Total Current Assets	\$40,542.47	\$26,135.68	\$14,406.79	
National Safety Council Reserve Fund				
Investment	12,629.18	1,000.00	11,629.18	
Office Furniture and Equipment	11,093.86	11,327.09		233.23
Deferred Charges	11,069.10	2,529.56	8,539.54	
			<u>\$34,575.51</u>	<u>\$ 233.23</u>
	\$75,334.61	\$40,992.32	\$34,342.28	
LIABILITIES				
	As at July 31, 1923	As at July 31, 1922	Increase	Decrease
Current Liabilities:				
Accounts Payable	\$ 4,002.85	\$	\$ 4,002.85	\$
Current Accounts (Local Councils) ..	1,565.68	1,828.20		262.52
			<u>\$ 4,002.85</u>	<u>\$ 262.52</u>
Total Current Liabilities	\$ 5,568.53	\$ 1,828.20	\$ 3,740.33	
Accrued Expenses	315.15	284.35	30.80	
Deferred Credits		3,060.00		3,060.00
Special Film Fund	10,100.00		10,100.00	
Reserve for Future Service to Mem- bers	12,629.18	1,000.00	11,629.18	
Surplus	46,721.75	34,819.78	11,901.97	
			<u>\$37,402.28</u>	<u>\$3,060.00</u>
	\$75,334.61	\$40,992.33	\$34,342.28	

STATEMENT OF GROSS REVENUE AND EXPENDITURE

Fiscal Year Ending July 31, 1923

GROSS REVENUE

Membership Dues:	
Active	\$164,369.06
Additional Service	574.50
	<u>\$164,943.56</u>
Sales of Pamphlets, Bulletins and Miscellaneous Receipts	16,015.14
Gross Revenue, 1923 Calendars	62,521.94
Gross Revenue, National Safety News (Dues from Council Members not included)	16,875.01
Interest Earned	289.23
	<u>\$261,644.88</u>

GROSS EXPENDITURE AND DISPOSITION OF NET REVENUE

Annual Congress Expense	\$ 2,529.31
Annual Congress Exhibit	1,622.81
1922 Annual Congress Proceedings	5,566.45
Automobile Dash Cards	74.27
1923 Calendars	38,070.90
Cartoon Service	36.29
Chauffeurs' Lessons	196.46
Depreciation, Office Furniture and Equipment	1,716.05
Exchange	231.93
Expenses of Various Local Councils	529.11
Field Work, including Salaries	7,196.02
General Bulletins	13,482.28
General Office Expense	3,348.53
Library Expense	418.71
Membership Solicitation Expense	6,100.51
Miscellaneous Publication Expense	2,057.73
National Safety News	28,377.68
Office Printing and Supplies	2,480.38
Postage	2,498.09
Publicity	170.99
Rent of General Offices	6,000.00
Safe Practice Pamphlets	1,884.68
Salaries of Officers and Staff	79,865.22
Sectional Activity Expense, including printing bulletins	16,944.61
Sundry Activities	11,092.86
Taxes and Insurance	502.88
Telephone and Telegraph	1,526.01
Traveling Expense—Administrative, including National Committee Expense	3,383.48
Loss from Exchange of Equipment	178.75
Adjustment of Reserve for Bad Debts	157.49
Total Gross Expenditure.....	\$238,240.48
Transfer to Reserve for Future Service to Members.....	11,502.43
Transfer to Surplus	11,901.97
	<u>\$261,644.88</u>

HOMER E. NIESZ, Treasurer.

We have examined the above Comparative Balance Sheet of the National Safety Council as at July 31, 1923, and July 31, 1922, and the attached Statement of Revenues and Expenditure for the year ending July 31, 1923, and have compared them with the books and vouchers and have found them correct.

Chicago, Illinois, August 13, 1923. ARTHUR YOUNG & COMPANY,
Certified Public Accountants.

Our financial experience since the beginning of the new fiscal year is indicated by the following figures:

Total Income August 1 to September 29, 1923, inclusive.....	\$19,403.99
Total Disbursements August 1 to September 29, 1923, inclusive.....	19,143.90
Bank Balance	6,695.05
Accounts Payable	7,121.70
Investments	9,985.25
Uncollected Dues	\$14,299.72
Notes Receivable	408.37
Miscellaneous Accounts Receivable	4,940.61
Total.....	\$19,648.70
Reserve Fund Account on Deposit	1,407.74
Reserve Fund Account Investments.....	12,938.22
Total Reserve Fund Account.....	14,345.96
Film Contributions included in Bank Balance.....	\$3,623.55
Local Council Dues collected, included in Bank Balance....	469.68
Total.....	\$4,093.23

A motion was regularly made, seconded and carried that the Treasurer's report be accepted.

**REPORT OF VICE-PRESIDENT IN CHARGE OF
INDUSTRIAL SAFETY**

C. B. AUER

I have decided not to submit the very complete, illuminating and far-reaching report I prepared, but simply to say instead that our efforts during the past year have been reflected in the columns of the *News*, in the bulletins, the Safe Practices pamphlets, and in the activity of the Council generally.

**REPORT OF VICE-PRESIDENT IN CHARGE OF
PUBLIC SAFETY**

DAVID VAN SCHAAACK

I think that public safety is destined to be perhaps the greatest activity of the Council in the future. The Council has certainly done a wonderful work in industrial safety, and that work is by no means done, but the field of public safety is really so much larger that I venture to predict that the future of the Council lies largely along those lines. I think the Council is on the right track in public safety. Of course, the solution will never entirely be found, and the work done so far has been largely experimental, but public safety depends upon two things, the interest of the public and appreciation of the public hazards and the need for overcoming them, and I think the Council through its organization of locals, through organizing communities themselves for their own public safety, is decidedly on the right track, as the Council is also trying to enlist the aid of that great organ of public opinion, the press.

During the past year the Council has kept at work along those lines of public safety. Perhaps the most notable thing it has had connected with it has been a continuation of the movement for motor vehicle conferences. The Council has the privilege of calling the first conference of the administrators of the Western States held in Chicago, which will eventually include about fifteen states, and that conference is now well organized and actively at work just as the Eastern Conference is. With the extension of that conference movement to the South and the extreme West, the country will be organized along those conference lines, and I think eventually we will get near as possible to uniformity of safety laws and safety regulations so far as they apply to motoring traffic.

**REPORT OF VICE-PRESIDENT IN CHARGE OF
SECTIONAL ACTIVITIES**

GEORGE T. FONDA

The Congresses are becoming so congested, as most of you know, that it is pretty difficult to cover all the ground and get around and attend the meetings that you are most interested in. In the Engineering Section we figured that at least we could eliminate some of this congestion by holding our meetings in the different parts of the country during the year.

The Engineering Section simply made the background for these meetings, and we tried to discuss such subjects as were of interest generally to that particular community, and a great deal of stress was put on the question of public safety and traffic regulation, which, as Mr. Van Schaack says, is getting to be a very important phase of the safety movement in this country.

The local Councils in Chicago and in Detroit are certainly doing a fine piece of work, and we hope that the aftermath of meetings held in these cities has been worth the effort that we put into them.

REPORT OF RESOLUTIONS COMMITTEE

C. P. TOLMAN

"WHEREAS, This Annual Safety Congress is favored by location in a city whose public officials, civic organizations, industries and leading citizens have shown an exceptional interest and ability in overcoming its accident problems, both industrial and public, and

"WHEREAS, This demonstration of successful safety work, no less than the courtesies of the same organizations and individuals in arranging for this Congress, forms a most valuable contribution to the cause of Safety, therefore be it

"RESOLVED, That a vote of thanks be extended to the City of Buffalo, the Honorable Frank X. Schwab, Mayor, the Commissioner of Police, the Board of Education, the Safety Bureau of the Buffalo Chamber of Commerce, the Niagara Frontier Convention Committee and to Mr. A. L. Kinsey, its General Chairman, to Mr. John B. Madden, the Chairman of the Industrial Safety Committee of the Buffalo Chamber of Commerce, to Mr. A. B. Wright, the Chairman of the Public Safety Committee of the Buffalo Chamber of Commerce, Mr. Floyd M. Wills, as Treasurer, and to Mr. Sydney H. Coleman, Manager of the Buffalo Safety Council, and all the members of this Council and its committees, and to all others who have assisted towards the success of the 'Five Days for Safety' and of this Congress."

I move the adoption of this resolution.

(The motion was seconded and carried.)

It is customary at these Congresses, as you know, to re-enunciate the principles for which this Council stands, and I therefore offer the resolutions as we have offered them from year to year and have found no occasion to retract.

"WHEREAS, The 50,000 accidental deaths and millions of injuries occurring each year on our streets, in our industries, in homes and elsewhere are a blot on American civilization and the cause of untold suffering and sorrow, and

"WHEREAS, The direct economic cost of accidents involving personal injuries and deaths is estimated to run into billions of dollars annually, and

"WHEREAS, The safe and expeditious handling of street and highway traffic has become a most serious problem and the number of automobile fatalities is steadily increasing, and

"WHEREAS, Experience has demonstrated that at least seventy-five percent of industrial accidents are preventable and the organized effort of certain communities indicates that an equal reduction in public accidents is possible, therefore be it

"RESOLVED, That the National Safety Council in its Twelfth Annual Congress assembled in Buffalo advocate:

"1. The adoption and strict enforcement of uniform, practicable laws and ordinances for the safeguarding of traffic and the protection of the multitude of law-abiding drivers and pedestrians against the criminal recklessness of the few.

"2. The more careful study of our street and highway systems both existing and projected, by competent engineering and traffic experts from the standpoint of safe and efficient traffic movement.

"3. The safeguarding of all dangerous machinery and places in industry and elsewhere according to standard methods of proved value.

"4. The development of industrial equipment and processes along lines of inherent safety for the double purpose of eliminating accident hazards and increasing production efficiency.

"5. The education of all workmen and their supervisors in safe methods and habits of work.

"6. The training in safety thinking of all school children, as well as students in colleges and universities, both for their own protection and as an object lesson in good citizenship.

"7. The mobilization of all community forces through state and city safety councils for securing these ends through the overwhelming force of enlightened public opinion."

I move the adoption of that resolution.

The motion was regularly seconded and carried.

Mr. Tolman: Our former President and one of the founders of the society, Mr. Ralph C. Richards, has been very seriously ill. You will be glad to know that he is very successfully recovering. It is that illness that has kept him from us at this meeting and we all know how much it means to him not to be able to attend and how glad he would be to be with us. I am, therefore, as Chairman of the Resolutions Committee, with your assent, sending him this simple telegram which I will read:

"The members of the National Safety Council in meeting assembled send greetings and best wishes."

A motion to send the telegram was carried by a rising vote.

Mr. Tolman: It has been the privilege of the National Safety Council, conforming with the policy of its founders, to cooperate in the interest of safety with many national organizations. I hesitate to name any in-

dividually because there are too many to mention all, but prominent among the more recent national organizations directly cooperating for the advancement of safety are:

The Chamber of Commerce of the United States.

National Automobile Chamber of Commerce.

American Automobile Association.

Careful Crossings Campaign under the able direction of Mr. R. A. Rowe.

Boy Scouts of America.

There are many others, including innumerable local organizations.

Mr. Chairman, I therefore move that we view with hearty commendation the growing adoption of safety activities as an essential part of the activities of national organizations, and tender our continued co-operation in the future as in the past in support of such activities.

The motion was seconded and carried unanimously.

REPORT OF NOMINATING COMMITTEE

ROBERT SCOTT

"Complying with your instructions, we the Nominating Committee appointed by you, with the approval of the Executive Committee, and as provided by Section 8 of Article VI of the By-laws of the Council, and as further provided by Section 9 of Article VI of the By-laws, present herewith the report of the nominations for successors to the Directors whose terms of office expire at the annual meeting, October 1, 1923.

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

"Nominated to succeed those directors whose terms of office expire October 1, 1923:

"Charles M. Anderson, Manager, Memphis Safety Council, Memphis, Tenn.

"Julien H. Harvey, Director, Kansas City Safety Council, Kansas City, Mo.

"Herbert A. Rowe, Claims Attorney, Delaware, Lackawanna & Western R. R. Co., New York, N. Y.

"Major Robert Sylvester, Superintendent of Protection, E. I. du Pont de Nemours & Co., and Honorary President, International Association of Chiefs of Police, Wilmington, Delaware.

"The names of the following Directors whose terms expire October 1, 1923, are submitted for reelection:

L. D. Burlingame

L. A. DeBlois

H. W. Forster

Huston L. Gaddis

J. A. Oartel

C. E. Pettibone

Dr. A. D. Risteen

B. F. Tillson

C. P. Tolman

A. W. Whitney

Charles B. Scott

"Respectfully submitted by the Nominating Committee."

President Dow: No Members' ticket having been nominated under the provisions of your Constitution and By-Laws, a motion to close the nominations will be in order.

A motion was regularly made, seconded and carried that the nominations be closed.

A motion was regularly made, seconded and carried that the Secretary cast the ballot of the Congress for the nominees presented by the Committee, and Secretary Cameron cast the ballot.

Mr. Adam H. Lintz: On behalf of the Tellers' Committee, as Chairman, I wish to certify that 2,549 votes have been cast in favor of the new Directors selected by the Nominating Committee.

President Dow: You have heard the Report of the Tellers. What is your pleasure?

A motion was regularly made, seconded and carried that it be adopted.

President Dow: There is one particular item of new business to be brought before the meeting.

I would like to call upon Mr. Arthur Young to make his report with reference to an invitation from the League of Nations.

REPORT ON LEAGUE INVITATION

Mr. Arthur Young: At the Executive meeting last night an item of prime interest and importance to our membership was discussed, and I think it is also an item of prime importance to the world at large. Most of us are familiar with the fact that under the Treaty of the League of Nations, under the so-called Labor Section, there is created the International Labor Office with its Headquarters at Geneva, Switzerland. Its membership comprises representatives from the working classes, from employers and from government officials from fifty-two states participating.

Their session begins this year October 22, and the prime subject of discussion is methods of factory inspection.

The National Safety Council has been honored by an exchange of cablegrams with Mr. Thomas, the President of the International Labor Office, and invited to send a lecturer to place not only before one country but the whole world the safety story of America.

That invitation carries with it recognition of our Association as the prime organization, the most important organization in the world, and very definitely we are recognized in those communications as having done the most effective safety work in the world.

At the Executive Committee meeting last night the invitation was accepted. Arrangements are now being made to select a lecturer and representative films, and already we are assured unofficially that official invitations from the governments of the British Empire, from France, from Holland and other Continental countries will be offered our repre-

sentative so that his trip to Geneva at the expense and invitation of the International Labor Office will become virtually a world-wide tour of a National Safety Council representative.

A motion was regularly made, seconded and carried that the Congress approve the action of the Executive Committee in accepting the invitation.

President Dow: It gives me great pleasure to introduce to you at this time the Industrial Commissioner of the State of New York, Honorable Bernard L. Shientag.

ADDRESS OF NEW YORK STATE INDUSTRIAL COMMISSIONER

BERNARD L. SHIENTAG

On the whole, the present standard of living of the working men and women of America is the highest in the world. While this fact must be gratifying to all of us we must be equally conscious of the fact that in a country as rich and powerful as ours there is still much room for the improvement of that standard. Particularly is this true of certain industries in which large groups of women are employed at less than a living wage. But the present standard, at least, will be maintained. Our workers will never return to the level of other days. History justifies this conviction. Workers of every age have managed to retain the standard of living gained during periods of prosperity and plenty. Employers or plant managers who keep this fact in mind in planning for the future are farseeing. Those who look for any real reduction in wages to solve their difficulties are most likely doomed to disappointment.

Industry, therefore, must be so organized and so conducted as to maintain present standards of living and, in fact, to improve upon them from time to time. How can Industry perform this task? And by "Industry" I do not mean employers alone, but employers and employees who together constitute the economic fabric of the nation.

In the first place, industry must become more efficient and more productive. Waste in industry, which has been estimated as high as forty per cent, must be materially reduced. Faulty methods of business administration and of production, and the waste of seasonal employment, when corrected, will, it is estimated by scientific investigators, save billions of dollars every year. Labor, too, must do its part in bringing about the elimination of wasteful practices and in helping to attain for industry that degree of efficiency which will enable it to meet the requirements of a decent standard of living.

In addition to greater efficiency in the methods of production and of business administration, greater attention will have to be paid to the conservation of the human resources of industry—to the prevention of industrial accidents and diseases. Here, again, capital and labor can accomplish but little of value, if they stand separate and apart from one another. Capital and labor working wholeheartedly together can do much to reduce the tremendous human and economic loss occasioned by the

large number of industrial accidents every year. It has been estimated that about eighty per cent of all industrial accidents are due to neglect. If only one-half of these were prevented by proper care and safeguards, industry would save enormous sums every year which would inure to the benefit of employers, employees and the consuming public. A speaker at the Safety Congress of the Labor Department last year estimated the economic loss to the country as the result of industrial accidents to be over a billion dollars a year and in the State of New York to be over one hundred million dollars a year. I believe this to be a very conservative estimate for it does not take into consideration the loss in production and the loss involved in training those injured.

INCREASE IN INDUSTRIAL ACCIDENTS IN NEW YORK

In the State of New York today we find that the industrial accidents reported to the Labor Department during 1923 show an increase in number of approximately fifty per cent as compared with the last six months of 1921 and an increase of fifteen per cent over the last six months of 1922. How much is due to increased employment, or to better methods of reporting, we cannot state.

When we also consider the tremendous losses occasioned by illness among industrial workers, much of which could be prevented; when we consider the impairment of health and of efficiency caused by unwholesome working conditions, we are forced to the realization that in this field of human conservation lies the hope and the salvation of American industry for the future.

The steel industry has yielded to popular demand and is now in the course of abolishing the twelve hour day. It may be safely predicted that this change will result in a gradual but steady decrease in the number and severity of accidents, less lost time by employees, and increased efficiency and production for the industry as a whole.

What happens when a man loses an arm or leg in an industrial accident which could have been prevented if care and precaution had been taken? The employer pays; the employee pays, because no amount of compensation that he receives can replace the lost member of his body; industry pays in the form of increased cost of production and the people as a whole pay because they have to assume and share this increased burden.

The National Safety Council is doing much to bring home to employers and employees the message of safety in industry. This is not the work of a day or a year. It is a task of continuous effort, slow in its results, but rich in the rewards that it holds forth. In addition to the efforts of individual employers and of organizations such as yours, public departments of the state and nation should wage an unceasing campaign to bring about this result. Departments of Labor, of Health and of Education should marshal their forces to conquer this deadly but vulnerable enemy which drains the economic resources of the nation. Inspection alone will not do this. Methods of compulsion cannot bring about a suc-

cessful solution. After all, the hope for the future lies in a continuous process of education that will day in and day out preach the gospel of health and safety in industry and teach the principles and methods whereby accidents and diseases may be reduced.

I pledge you the most earnest and energetic efforts on the part of the Labor Department of the State of New York in such a campaign. There is no more important function that a Labor Department can perform than to point out the way to reduce industrial accidents and disease. Let us not be discouraged by the magnitude of the problem before us. It can be solved. If we look back twenty, or even ten years, we realize the progress that has been made. Let us continue the task with increased vigor and energy and we shall not only profit in a material way, but we shall be performing the greatest service that it is possible to render to our fellow men.

THE INNER MEANING OF THE SAFETY MOVEMENT AND ITS APPLICATION TO THE PROBLEM OF EDUCATION

A. W. WHITNEY, ASSOCIATE GENERAL MANAGER, NATIONAL BUREAU OF CASUALTY AND SURETY UNDERWRITERS, NEW YORK CITY; SECRETARY, EDUCATION SECTION, NATIONAL SAFETY COUNCIL

The time has come in the development of the safety movement, when it is necessary to make not only an estimate of what has been accomplished but also a forecast of what there is to do. The first big blow against waste of life and limb has been struck and for this it was scarcely more necessary to have a philosophy of safety than it was to have a philosophy of life-saving when a child that is within reach is drowning. The big, obvious things have been done; the emergency has been met. The problem now reaches further back into the structure of society. Where does the safety movement belong in an orderly organization of society? What are its possibilities; what are its limitations; how does it join up with the other elements of life; and finally in the light of the answers to these questions how can it be developed in the best possible way?

I must qualify my statement by admitting that the emergency has not been fully met in the public safety field; here there is still pioneer work to be done. But in a certain sense this only substantiates my point, for in this field it is by no means obvious what ought to be done. The problem is here much more intimately intertwined with the social structure than in the case of industrial safety and it is to a very considerable extent educational.

SAFETY PROBLEM NOW EDUCATIONAL PROBLEM

The safety problem is now indeed in every field primarily an educational problem; and it is this fact particularly which makes it necessary to have a philosophy of safety, for we cannot afford to teach safety, and particularly to our children in the schools, unless we know what we are doing and what the underlying results of our teaching will be.

A good example of the closer analysis that must be made when the problem becomes educational arises out of the use of the slogan "Safety First," and this is a particularly good example for it brings us to the very heart of the practical problem.

The term "Safety First" originated, I believe, in the railway field and there it is literally applicable for safe operation is a condition upon which all other elements of railway operation must rest; and it was natural enough that it should have been extended to the industrial field as well, for there also under normal conditions it is equally applicable. But a kind of inertia it has been carried still further so that it is popularly supposed to express the guiding principle of the safety movement in general. As a general statement of our attitude toward life it is, however, not only grossly inadequate but positively wrong, misleading and harmful; and it can be excused only as one of those careless, exuberant overstatements which we as a people are so fond of making and which we do not expect to have taken literally; and yet the world is full of literal-minded people.

SAFETY NOT A PRIME OBJECT IN LIFE

It is not true that safety is the prime object in life. We do not need more than a casual knowledge of either history or the human heart to realize that the passion for a first-hand experience of life with all its freshness and poignancy and danger is the driving force in the world. And when this is gone life will have lost not only its flavor but its spiritual significance as well. To attempt therefore to teach safety first in a literal sense to a child is to do violence to feelings that are deeply embedded in his nature and must result either in repression and fear or in repudiation as at the hands of the two children of a friend of mine. He lives on Long Island Sound; his boy and girl are strong and fearless swimmers but the shore is somewhat dangerous and in an uninspired moment he let his anxiety take the shape of two neatly framed "Safety First" signs which he hung in his children's bedrooms. He saw at once that the signs had produced an effect but the nature of the effect was not evident until a few days later when he woke to see on his own bedroom wall a sign neatly framed reading, "Aw, Take a Chance." He is an Irishman with a sense of humor and he saw the point. This was the perfectly normal reaction of a healthy-minded child to the attempt to make safety a primary element in life and any such experience as this must wake us up with a shock to a sense of the delicacy of the field in which we are working and to a sense of how much it behooves us to know what we are doing lest we do more harm than good.

This is primarily an effort to penetrate below the surface of the safety movement and to realize the realignments that are necessary if we are to hope to be successful in getting safety into the schools and in having it properly taught.

THE SAFETY MOVEMENT IN DRAMA

I cannot do better in presenting the matter than to give the reasoning which led the Education Section of the National Safety Council to think

that the safety movement might be properly presented in dramatic form. Art is a touchstone; it will tolerate nothing that is not true and right and wholesome in the deepest sense; it will have nothing of special pleading and propaganda. If then we can make a drama of safety we are sure by that token to be on substantial ground.

The more immediately practical impulse toward dramatization came however from the following consideration. The experience that we had already had in the schools of certain cities such as St. Louis and Detroit had shown that a 50 per cent saving in accidents among children was quite possible and therefore a saving of 10,000 lives per year if such work were done in all the schools throughout the country. Furthermore, we could reasonably expect that such work would produce a changed psychology in the next generation which would express itself in better laws and a better public opinion. But to get access to the schools required first a certain adult education among school superintendents and parents. This was too difficult and too slow a process to accomplish through an appeal to the intelligence and if we were to have the success that we desired we should have to make our appeal through the more quickly-turning gate of the emotions. But an appeal to the emotions on any adequate scale meant dramatization. But dramatization to be legitimate and effective must be rooted in something fundamental. It became therefore of the greatest importance to find out what the dramatic possibilities of safety might be. The following was the line of reasoning pursued.

The word accident by derivation means something that "falls across." Falls across what? Evidently some orderly procedure, for if there were no order there would be nothing to distinguish an accident from any other happening since in that case every happening would be equally casual. An accident implies, therefore, an order in the world and this, by a liberal but legitimate use of the word, we may characterize as a purpose, a purpose that is unfolding itself and whose existence we recognize, at any rate when it is interfered with. An accident is therefore something that balks the order or purpose of the world and safety is something that lets it have its way. Safety is then a part as it were of the great order itself.

To discover the world-purpose and to bring life into harmony with it is nothing less than the very goal of life and not easily to be reached. But to go far enough to find where safety belongs in the world-order is not difficult. We need only realize that the human race has reached its present estate not only by an easy growth but by an intense struggle in which the victor has been he whose soul was most on fire with the urge of life and that our ancestors have poured all this potent, restless energy into our veins. With this inheritance life must be lived as an adventure if it is to be worth carrying on. Nature has not been satisfied with a perfunctory, spiritless performance of the life-drama but has filled it with passion. Birth, a baby at its mother's breast, growth, a wide-eyed, wondering child eager for life, maturity, the kindling of the spark of life in new dependent lives and the manifold experience of caring

for them, death, the completion of the span and the slipping away to make place for those waiting to be born; these are high adventures in which the human spirit comes to grips with eternal realities. It is the purpose of the world that each should have his adventure and it is the supreme mischance if he fails to find it!

Safety then, guardian of the unfolding world-purpose, instead of diminishing the adventure of life is precisely that which makes it secure. Instead of making the world safe *from* danger we are in a far deeper sense making the world safe *for* adventure, or, in a still fuller sense, we are saving the world the bad adventure which mere chance has waiting for it and for the good adventure which it is the purpose of the world that we should have.

It seemed clear to us after such a forecast that the stage must be set for heroic action. Our thoughts went back to the Greek drama, the conflict between the will of man and the world-purpose under the form of necessity or fate. But here was scarcely less compelling theme, the conflict between the world-purpose and blind chance, led on by ignorance and carelessness.

The practical problem for the dramatist clearly was to present life as adventure with chance and safety playing their proper roles. We were fortunate in being able to interest Thomas Wood Stevens in the problem. He wrote the play and called it "Adventure."

The play is not propaganda; it is deeper and more powerful than propaganda. I am not sure that the word safety even occurs. Its purpose is to lay a basis for a right understanding of what safety means, without which we cannot build a worthy and permanent superstructure. It is a modern drama of adventure.

We had expected to have the play performed by an admirable local amateur organization known as the Buffalo Players and preliminary announcements were made to that effect but it later appeared that a more adequate interpretation could be given, considering the short time at our disposal, by turning the whole undertaking over to the Department of the Drama of Carnegie Institute of Technology, which through the cooperation of President Baker and Professor Stevens we were able to do. We have thus the added advantage of having the play produced under the direct supervision of the author, at the same time that we are receiving valuable cooperation from the Buffalo Players.

The play is frankly an experiment. We have tried it here because we want you to be the judges of whether it is worth while. Are we right in thinking that the dramatic appeal of safety is the most ready way to the emotions and thus to effective action? It is an experiment in another sense for the interpretation that we have given touches only one of many aspects of the subject; there are others that will repay dramatic treatment.

RELATION OF SAFETY TO EDUCATION

At this Congress the Education Section has also provided an exhibit which aims by an appeal to the eye to tell much the same story. The

pageant-drama is meant for grown-ups, for the immediate problem is to reach the parents and so to unlock the schools, but the exhibit is meant for the children and those of larger growth who still have the heart of a child.

This is not the time to attempt to develop the practical consequences of this aspect of safety. One general fact however, is so obvious as to demand attention, namely, that the public safety movement and the recreation movement must go hand in hand. We cannot put the children off the streets unless we can provide other places for them to play. We have no right to drive out the bad adventure, bad as it may be, unless we can make the good adventure possible. In other words the safety movement if it is to be a force in the world must be definitely positive and not negative; it must open the door to the beautiful life at the time that it closes the door to the ugly life. This is an exceedingly difficult problem, particularly in the cities. An authority on the care of children asserts that the problem of adventure is the most serious of the problems of the city child, far more difficult to solve than the problem of health. We shall, however, not make much progress with the public safety movement until it can be put on such a basis.

The second part of the problem has to do with the relation of safety to education. We have had fair success in getting schools to put safety into their curricula. Shall we be satisfied with such progress or may we look for still greater things? The answer to the question I am satisfied depends upon what safety has to contribute to education rather than upon what education has to contribute to safety.

Education must be directed toward the problems and needs of life. If, however, the place of safety in the educational system is to bear a direct relationship to the seriousness of the problem of accidents among the other problems and needs of life, its place cannot be large. Life is full of tragedy and one must admit, without minimizing the enormous loss and suffering from accidents, that there are other forces at work in the world which are still more cruel. War, disease, crime, vice, poverty and still other social and economic maladjustments, all weigh more heavily upon humanity; and the Great War, the Russian famine and the Japanese earthquake bear contemporary witness to the cheapness of life. Furthermore, the principal work of the schools must always be a preparation for the normal activities of a well-ordered life. The strength of the claim of the safety movement upon a place in the educational system is not to be measured primarily by the saving of life and limb, however important that may be.

Education is the process by which one becomes fitted to be a working part in the world-order and it is equally the process by which one becomes fitted to experience the satisfactions of life in the fullest and deepest sense. The results are to be had only through an appreciation and an understanding of the forces that control the world and an educational system is to be judged by the success with which it brings such knowledge. The question of whether a particular study belongs in the curriculum is to be decided therefore not in the light of its

immediately practical effect but by means of this larger and fuller test. Cooking and manual-training have been introduced very generally into the schools. This was not primarily to make good cooks and carpenters. The fundamental reason was that these things bring the child into a knowledge of primary human needs, those of food and shelter, and the ability to satisfy these needs gives him a sympathetic understanding of the world and his place in it that makes him play his part, whether it be that of cook or carpenter or that of physician or statesman, not only more acceptably to society but with greater understanding and appreciation and consequent satisfaction to himself. It is by such a criterion that the study of safety must be judged. The question is then: What can a knowledge of safety contribute to the higher discipline of life?

SAFETY WORK BEGAN AGES AGO

I say that the primary purpose of education is to fit one for taking a working part in the world-order. But safety is the condition which allows the world-order to go on and is thus at the very bottom of the problem. The history of evolution in the animal and plant world makes this quite plain. The success of an individual or of a species to find and retain its place in the world is measured by its ability to make itself safe. Survival of the fittest is the survival of the safe, if the word is used in its broadest sense. Safety education has therefore been in the curriculum of nature from time immemorial. The mother bear teaches her cubs the dangers and the good adventures of the forest and the sand-piper's babies know the perils as well as the joys of the beach. There must have been Dr. Paynes even in the Paleozoic age and they were equally successful, otherwise we should not be here today.

The only new thing about the safety movement in our day is that it is a movement and not an institution or an instinct, and that is wholly because of the abnormally rapid development of modern life. If life flowed on as it did in prehistoric times safety would be a family matter; it would be part of the family discipline, like not eating with one's knife or not lying abed in the morning, both undoubtedly prehistoric vices. But those were days when it took a hundred thousand years to produce a first-rate peril like the megatherium and a family had leisure to develop instincts and traditions; but nowadays generations of species (that is, new models), of automobiles (the modern megatherium) have come and gone in a time in which the megatherium would not even have changed its stream lines. Schools exist because of our inability to keep up with the development of the world; they are artificial institutions, and their discipline only a vicarious family discipline. That we should need to teach safety in schools is therefore no stranger than the fact of schools themselves. Such reasoning is sufficient to prove that safety is entitled to a place in education; whether the place is an important one, however, is still to be shown.

To learn the world-order is the task of education. But to do this is not enough to see the world running right; it is necessary also to see

it when running wrong. The best way to learn about an automobile is not to watch it when it is firing on all cylinders but to take it apart and make it go when there is something the matter with it.

There are plenty of disorders in the world for young mechanics to work on, but there is very definitely a problem in finding disorders that are sufficiently simple for a child to understand. To understand the maladjustments that underlie the World War, the coal strike, the Russian situation, the occupation of the Ruhr, the Versailles Treaty, the negro question or the divorce question it is necessary not only to have an intimate knowledge of an exceedingly complicated background of facts, but it is also necessary to understand the motives that are back of human behavior. These problems are vexatious also because they depend upon imperfectly accepted social and ethical standards, but even the problems that arise in connection with established standards are of doubtful educational value.

PROBLEMS OF EDUCATION

The primary problem of ethical education evidently is to discover those parts of the child's mind which have been sensitized by race experience and those parts of life where an experience can be readily acquired that will serve as a background for judgments of conduct and where the problems of behavior are relatively simple. Such a study will indicate the points at which an approach can be most effectually made.

For the darker background I propose that the maladjustments that are responsible for accidents be made use of as being the simplest and most available examples of an imperfectly ordered world. Such examples are for the most part extremely simple, the evil effects are evident, the conduct that is necessary for their avoidance is readily discoverable and can in many cases be put in operation by children themselves, and the emotional appeal, particularly with children, is exceedingly strong. Flowing blood and bruised flesh are clearly not a part of a well-ordered life; an emotional understanding of this comes to a child as part of its race inheritance, as the mental residuum from its pre-historic safety lessons; so that to teach world-order through safety is to build directly upon the past.

Another advantage of this approach arises out of the substitutional character of safety. Safety substitutes the good adventure for the bad adventure. It involves therefore a study of values. What is the good adventure? What is the bad adventure? What makes it good? What makes it bad? What is worth while? What is not worth while?

The ability to make such discriminations is one of the crowning achievements of the human spirit and there is no reason why even the youngest child should not begin to make such distinctions if sufficiently simple. Here, therefore, in effect is the opportunity to let a child begin to build up for himself a philosophy of life which may, if it is not mis-handled, become a real force in years to come. This approach to the study of values not only makes use of the child's instinctive feelings

with regard to danger but, through the connection of safety with adventure, carries the problem of choice of conduct far over into the realm of positive values.

This entire analysis has been built upon the conception of a world-order; a world that is not the plaything of chance but the expression of an unfolding purpose; a world in which the traveling shuttle of life weaves the woof of a man's restless activity into the warp of eternal truth and in which as artist and creator he is himself making the pattern. We are only standing guard to see that the pattern is not carelessly spoiled.

THE YEAR'S EXPERIENCE WITH LOCAL COUNCILS

L. A. DE BLOIS, VICE-PRESIDENT, NATIONAL SAFETY COUNCIL; E. I. DU PONT
DE NEMOURS & COMPANY, WILMINGTON, DEL.

This has, I am convinced, been a year of satisfactory progress. We commenced the fiscal year with 34 chartered local councils; of these only 18 were provided with paid full-time managers or secretaries. We have finished the year with 51 chartered local councils and of these no less than 30 have paid full-time managers or secretaries. Of these seventeen new councils eleven have been the direct result of field work, in eight instances on what might be termed "virgin soil." These eleven new locals of our own organizing are:

Atlanta	Providence
Baltimore	Richmond
Des Moines	Springfield (Mass.)
Memphis	Springfield (Ohio)
Nashville	South Bend
	Toledo

This list of prominent cities newly organized for safety is highly inspiring.

Very considerable advance was made in providing more adequate service to the locals. For this much credit is due our Managing Director, Mr. Cameron, the Chief of the Public Safety Division. Mr. Rosseland, and the Vice-President in Charge of Public Safety, Mr. Van Schaack. Needless to say the successful field work of the year can be largely credited to the experience, resourcefulness and untiring efforts of the field secretaries, Messrs. Smith and Rasmussen.

As for the personnel of the local councils themselves, one has only to look back over the intimate and beneficial conferences of the local council secretary-managers this year at Chicago, New York, St. Louis and Buffalo to realize the fine spirit of this body of men who are guiding the safety work of great communities in remote parts of the United States and who are the outposts of the National Safety Council and the present pioneers in public safety development.

I have paid but scant tribute to the progress of local council work during the past year and to the ability and spirit of the men to whose efforts it has been due, but my excuse is a desire to place before you within a limited time what I conceive to be the lessons which we should glean from this experience.

The world has become mechanical—manpower and horsepower (except as a unit of measurement) are falling into disuetude. "Harnessing Niagara" was an achievement, conveying its force to great distances was an accomplishment, but to make Niagara freeze itself into little cubes in the millionaire's kitchen, brown the buckwheat cakes on the foreman's breakfast-table and drive the sewing machine in the third-floor-back transcends any of Aladdin's mythical efforts. Not content with harnessing mere coal deposits and rivers, man harnessed the oil fields, and with what result?—the development of cheap and light mechanical motive power enabling him to flivver the sea, flivver the air, and flivver the surface of the land. See also what the gas engine is doing for the farms—the last stronghold of horsepower. The up-to-date farmer ploughs, reaps, threshes, harvests, milks and goes to market by mechanical power; his wife churns, pumps, sews and sometimes cooks with it; and when the day's work is done they sit together under its light and listen to music which power is broadcasting a thousand miles away. First into our industrial life, next into our public life and finally into our home life have crept the manifold applications of power to our daily needs. But, because power is the application of mechanical forces which the human body cannot withstand, power has taken and continues to take its toll of life and limb. The path of its application to man's needs is tracked with blood—first in the industries, some of which a decade ago were called "slaughter-houses," today upon the streets where every man's life is in jeopardy—perhaps tomorrow within our homes, its latest field of conquest.

MUST ROUSE PUBLIC CONSCIENCE

Nature's own efforts to protect the individual of the species from the dangers of his environment are marvelous but they are inexorably slow. Human efforts at protection will always lag far behind the inception and even the conception of the hazard. It seems that an incredible number of human beings must be killed or injured before the public conscience is aroused. It is true that the majority of those industrial establishments which were termed "slaughter-houses" have at last become "a safe place in which to work," but yet the automobile has been allowed to take a toll of 100,000 lives in this country alone and notwithstanding our recognition of what is going on in the annual increase in automobile deaths has by no means been arrested. It is our human failing not to foresee these evils and our human weakness to close our eyes to their appalling growth until we awake to find in their elimination a huge national problem.

The center-of-gravity of accidental deaths in the United States was probably at one time situated in the industries, but since the inception of

the Safety Movement it has been slowly transferring itself to the field of public accidents, in other words to our streets, our highways, our transportation systems and our public buildings. It is following, as I have already said, the advance of power, but whether, as we develop public protective measures and diminish thereby public accidents, it will transfer itself to our homes, remains to be seen—for today it is sufficient to realize that the focus of the disorder is moving into the public life of the community. Very recent data are not available, but for the year 1920 the figures developed by the Statistics Committee of our Public Safety Section show that among a large group of insured industrial wage-earners, industrial hazards were responsible for little more than one-quarter of the accidental deaths, while the remaining three-quarters were caused by public and home accidents. This is significant and, incidentally we wonder if the industrial manager today realizes that for every man killed at his work he loses three from accidents happening outside. It is the answer to his question, "Why should I be interested in public accident prevention?"

We have before us then two pictures: on the one hand, the industries where accident prevention has been undertaken, has been successful and has been captioned "good business"—and on the other, public life, where the accidental death rate is increasing, where accident prevention is in its infancy, where few communities have been wholly successful, and where the general public is not yet awake to its moral responsibility. It is plain that to guide us in the development of public safety work we must draw our lessons from industrial experience. What are these lessons?

LEADERS OF PURPOSE AND VISION NEEDED

First, we must have leaders, enthusiasts, men of vision, but practical and not dreamers—men who can measure the hazard and its growth, who can weigh the value of life and who, in the spirit of self-sacrifice, will give their time to bring the vision closer to fulfillment. Such were the men who led the industrial safety movement a decade ago and formed the National Safety Council. Whence shall we draw these leaders for the public safety enterprise if not from among those gathered here today and from those others not present but who can be brought into an organization such as this?

The greatest advances in public safety work have come about through the activities of paid managers and I would go further and say that successful public safety work cannot be successfully carried on in communities of over 100,000 except when such men are employed.

Next, and indispensable, are "the sinews of war." We must have money—the more money the more results. How shall we obtain it?

In the beginning the *industrial* safety movement was financed to a great extent by those industries which were experiencing heavy industrial accident losses and to a less extent by the insurance interests. Why did the industries assume the heavier share of the burden when they were after all, protected from their heavy losses by insurance coverage? It

was, I surmise, because of their acceptance of the fact that their own industrial process hazards were responsible for industrial accidents. Applying this lesson—if it is a lesson—to the field of public accident prevention we should expect financial support not so much from those who are liable to injury by public accident (the public) and not to a very large extent from the insurance companies, but rather from those interests whose operations contribute to form the public hazards. Practically this is exactly what is under successful demonstration today by some of our larger local councils. The larger part of their revenue is not coming through popular subscription—that is, from the possible victims of public accidents—but from the public utilities, from the operators of fleets of motor vehicles and in some cases from the individual car owners. All of these contribute to the public safety hazards. It is logical that they showed support to the public safety movement for it places the burden in the proper quarter—the public suffers enough as it is!

ORGANIZATION AS A FUNDAMENTAL REQUISITE

There is one more fundamental requisite; it is *organization*. After the safety idea was sold to the industrial manager he proceeded to organize his plant for safety. The earlier form of organization was for educational purposes, to spread the gospel of safety—later he made safety an operating requisite and his organization had fewer “safety rallies” but dug deeper into the underlying causes of accidents and adopted more vigorous methods of prevention. We must *organize* our communities for public safety—first for propaganda and general education and later for deeper research and more fundamental prevention. We must organize for we can no more rely upon the general public coming suddenly to its own senses and preventing accidents than the industrial manager was able to rely upon the mass of his workmen doing the same thing in the case of industrial accidents. I ask you, if 100,000 automobile deaths have failed to automatically galvanize the American public into concerted action on the automobile hazard, what can we expect of it, unorganized and unaided? Neither can we rely upon the elected or appointed officers of the town, city, county, state or nation to undertake the work uniformly, successfully and unaided anymore than the industrial manager in the earlier days found himself able to rely upon his body of foremen or other assistants for the promulgation of the safety idea and the execution of accident prevention work unaided. The solution of the industrial accident problem lay in *organization*—the industrial manager called together his employees and said to them “accidents must stop—their occurrence is hurting us both,” and he called in a few picked men and said to them “you are a Safety Committee; when you meet, your sole object is prevent accidents,” and if he could afford it he employed a safety expert to devise, advise and stimulate—in essence he *organized* his community to meet the growing menace and meet it successfully.

We, too, must organize! We must have in our communities an organization formed for the sole and specific purpose of combatting the growing accident hazard. It cannot be any existing organization already

formed for general welfare purposes or an association of such organizations, because all such associations, societies and what-not have been purposely formed to fulfill other needs and have natural limitations in their field of activity. To be more specific we may point out by way of example, that the Manufacturers Association finds itself handicapped in handling problems touching the field of organized labor, the Y.M.C.A. may have difficulty in gaining the interest of the Catholic schools, the Automobile Club is usually called upon to back up and to a certain extent protect its individual members, and so on through the entire list. The commercial interests encounter similar embarrassments for we find that the local traction company cannot criticize bus drivers or taxicab operators without the imputation of attempting to curtail competition and if a local insurance company's efforts to prevent public accidents become too prominent they are discounted as a mere profit-enlarging scheme. Further down the line at the grade crossing the railroad blames the careless automobilist, but indignantly protests that elimination of grade crossings is a financial impossibility, and at the street crossing the auto driver blames the pedestrian and the pedestrian blames the auto driver. No, gentlemen, what we must have is a separate and independent community organization standing for safety alone, free to act on its own initiative and expand as fast as its strength permits, unhampered by social, commercial, religious or political limitations and able to go before the mayor, governor, judge, or any person or group of persons in the community and say "We do this thing for the protection of human life and for no other purpose." Then, and not otherwise, its position becomes absolutely unassailable and no malicious individual, clique or organization can upset or undermine it.

EFFECTIVENESS DEPENDS ON SYMPATHY OF PRESS

The rapidity with which public accident prevention can be made effective depends on the degree to which we can gain the sympathy and support of the local press and through it, and by the spoken as well as the written word, reach the thinking people of the community. In the early stages of the work especially much depends on well thought-out plans for work of permanent worth. Ill-arranged, hastily conceived schemes of spectacular value only, even though supported by endless enthusiasm, will not hold for long the interest either of the press or of the more substantial citizens—nor will they go far toward permanently decreasing the accidental death-rate. On the other hand the plan of a continuing, well-arranged campaign, itemized and budgeted can be laid before any intelligent business man with excellent chance of getting his endorsement. Whether his *personal* services can be secured depends upon his temperament, business engagements, and so forth. However, let me say that there is no man in this country too "big" to be approached and interested in public accident prevention. If he is shown a real reason for his personal interest and is convinced that the organization has a real value and is backed by practical, and not visionary men you will have at

least his moral support. To those who are already engaged in local council work I say go after the big men of the community—not merely those who head big undertakings, hold big offices or possess big bank accounts—but the men who are big because of what they are. Few of these can give time, not all will give money, but everyone of them can give moral support and upon a foundation of such moral support an enduring organization can be built.

The question is often asked, "Why a voluntary organization to promote public safety when there are public officials of city, county and state already charged, in whole or in part, with such duties?" There are several answers: In the first place it is quite safe to say that some officials lack the necessary imagination to conceive the idea of accident prevention—like most people they still believe that accidents "happen" rather than are caused; other officials realize but do not know how to act. We must also understand the tremendous number of difficulties lying in the way of concerted official effort. There are physical difficulties—as for example the impossibility of maintaining a sufficient number of traffic officers to adequately control traffic at all points in a large industrial center; legal difficulties—ranging all the way from questions of constitutional authority to mere technicalities, financial difficulties often due to appropriations which are insufficient or not accessible for the purpose.

MORAL REASON FOR INDEPENDENT SAFETY BODIES

But the most potent reason of all is the moral reason and it rests upon the basic fact that as a democratic nation we are governed as far and no farther than we desire to be governed. Practically, the mere enactment of a law is valueless if its enforcement is destined to become unpopular. Public officials, the police, and to a less extent the lower courts are dependent upon public support both in law enforcement and in general functioning. Electing or appointing a man to public or judicial office still leaves him a human being and, as such, he is to greater or less extent still swayed by what others think. His actions when in office are not so much influenced by desire for reappointment, for preference, for emolument as by the human wish to feel that the crowd is with him and not against him. And the man in public office is oftentimes terribly alone and must find alone the final answer to questions involving his entire future. If a representative organization such as a local safety council can show such a man first, the public demand for public action as reflected in the daily press; second, its willingness and ability to assist him in meeting this demand without thought of receiving credit for its efforts; and third, its intention of morally supporting his actions—then results may be expected. We have many notable instances of conscientious and effective safety work by motor vehicle commissioners, police department officials and other unaided by any citizens safety organization. but in most places where there is no civic organization such as a safety council expressing crystallized public opinion the approach towards public accident elimination is heartrendingly slow and irregular.

Progress toward the elimination of unnecessary death passes through successive stages of individual conception of prevention, discovery of cause, development of effective remedy and finally education of the public. Each year's experience of existing local councils and the addition of each newly organized council swells the reservoir of information at Chicago. No other organization, public or private, has such resources of information at its command as has the National Safety Council and no other organization is better fitted to assist our communities in effective local organization. There is still much to be learned, there are still unexplored regions and unassailed obstacles, though at least there is no valid excuse for making the same blunders that other communities have made at the cost of time, money, and unarrested human suffering. Public accident statistics show that we are gaining ground and local experience proves that local council work can be successfully supported. Let us then resolve to stimulate everywhere local council organization that we may go forward faster towards our goal of human safety.

ADJOURNMENT.

General Session

Joint Session of the American Association of Industrial Physicians and Surgeons and the National Safety Council

October 1, 1923

DR. C. E. FORD, Chairman

President, American Association of Industrial Physicians and Surgeons

S. B. BOTSFORD, Chairman

Attorney, Buffalo, N. Y.

PRESIDENT DOW: It gives me a great deal of pleasure to introduce to you the Chairman of this afternoon's meeting, who will now take charge and I present to you Mr. S. B. Botsford, an attorney and a citizen of Buffalo, who will be your presiding officer.

Chairman Botsford: You are dealing, in these meetings, with the fundamentals of human life, with the very existence of people, with whether or not people shall live or die, or, if they live, whether they shall be maimed or be halt, and under those circumstances I shall not introduce any humor or attempt to delay this meeting with any ill-timed remarks of my own. You have some fine speakers who will talk to the point and so I will proceed immediately to introduce the first of those speakers. With great pride I present to you the Honorable George Stewart Henry, of Toronto.

ACCIDENTS ON THE HIGHWAYS

HON. G. S. HENRY, MINISTER OF PUBLIC WORKS AND HIGHWAYS, TORONTO, ONTARIO

It is a great privilege and pleasure for one to come over and even for a short time address such a large and influential gathering as I see before me this afternoon. I appreciate the value of the work that you have been doing for the last ten or twelve years, and while I have not been actively engaged as a member of any Safety Council, I have been watching the results that have been obtained in the various areas that have been working during these years.

As I am dealing more particularly with the accidents on the highways, I want to get you back into the early history of the highway. We are told that the original highway was the footpath, possibly the trail of the

Indian in this country; and under what we are pleased to call in British Dominions the precedent, the pedestrian has right of way because he was first on the highway. Those of you who have been identified with railway administration in any way know what I mean. The railroad first on the ground has possession, and possession we have always looked on as nine point of the law. I don't want to lay it down as an axiom that the pedestrian has possession of the highway because he was first there, but as I would deal more particularly with accidents due to motors, I think that I am justified in putting the situation in that light, not from the standpoint that legally the motorist has no right on the highway, but that for the sake of human progress and for safety of the individual it is better for us as motorists to recognize the pedestrian as having possession of the highway.

I would like to point out, in the first place, that the pedestrian walking along the highway, no matter how absent-minded or careless he may be, is not apt to do anybody any harm. It is true he may run into somebody, but the results are not serious. Consequently, I think that from his standpoint he may be excused if he does become absent-minded. But the motorist, on the other hand, cannot afford to be absent-minded when driving a motor on the highway. He is in control of a dangerous machine, and in any case, if he should drive his machine into any obstacle he is apt to do damage to himself if not the obstacle he runs into. Consequently it behooves him to be ever alert in the operation of his machine that no injury comes to himself or to others using the highway.

EQUIPMENT MUST BE FIRST CLASS

Of course, there are a good many ways in which the motorist can protect himself and those on the highway in the care of his machine as well as in the driving of it. We all expect that his equipment must be in first class shape; he is negligent and sometimes I think he is almost driven to be negligent when he doesn't keep his equipment in good shape.

Just here let me remark that we have recently developed a four wheel brake on motor cars. To me in some respects that looks as if it is only a more dangerous machine than ever, because we are told that a four wheel brake car will stop in a shorter distance than one with two brakes. One with two brakes, if they are in good shape, will stop soon enough, and we are going to develop a machine that if it is not in proper adjustment and working efficiently is more dangerous than ever. I sometimes think that with the increase of motor cars, particularly on the American Continent, Providence has been somewhat behind us. How often have we heard the remark, "If the days of twenty-five, twenty or even fifteen years ago were with us when we had a greater supply of intoxicating liquors at our hand, what would have been the result?" So I say Providence must be behind us, more particularly where motor cars are in greater use per capita than in any other part of the world. We have greater restrictions along this line than they have almost anywhere else, and I think possibly restrictions that are needed.

Over in my own Province we have a new law coming in force the first of the new year. Those convicted of reckless driving or driving at excessive speed are to be sent to prison. We are not going to allow the use of the motor on the highway in a reckless manner or with an utter disregard for any speed laws. Those who are convicted of a violation of this section of the Act are to be sent to prison, so that they can think over their situation and realize that they owe something to society and the country in which they live.

Recently I heard the remark passed by one who had been visiting a city that there seemed to be more reckless and careless driving of motors there than anywhere else he had been, and on inquiry it was found that the police had lost heart because it was found almost impossible to secure convictions for breaches of the law in that particular municipality. We have to look to the courts, to those who sit on the bench, for various jurisdictions with confidence that they will administer the law for the benefit of the people at large.

DIFFICULTY IN SECURING CONVICTIONS

In my own Province the tendency of late has been to take questions of accidents on the highway away from the jury and give them to a judge himself because it has been found in recent years that it is very difficult to secure conviction for one who has been guilty of gross carelessness or recklessness on the highway. That wasn't always so. In my own Province a few years ago when we hadn't as many motors, when the motorists were in the minority, it was an easier matter to get conviction; now every man who sits on the jury is a motorist and he more or less feels that he is sitting in judgment on himself. Consequently, the tendency with us is to place the cases before a judge without a jury.

A great deal can be done to assist in the reduction of the loss of life and serious injury on the highways by legislation. It was with that idea in view to a large extent that the Ontario legislature last year revised its motor laws, its road laws, to control the traffic that has been developed upon them during the last few years.

Just here I would like to speak a word to you on the necessity of uniform laws, laws uniform not only in the United States but uniform in the Dominion of Canada as well, because as we go forward from year to year there is bound to be an increase in interchange of traffic. In my own Province we are looking forward annually to have more and more tourists driving over our highways, enjoying our incomparable scenery, our invigorating climate and the wilder sections of the country, for all classes of sport are available for any one who cares to visit us.

We are expecting you from the United States to come more and more within our confines, particularly during the tourist season, and in return we in Ontario and the rest of Canada are touring more within your confines every year, so that it is most essential that we as a people on the American Continent should lead to as uniform laws as practicable, uniformity in law in all its different phases, uniformity in signals, that is

signals from the motorists and signals or sign posts placed upon the highway. A great deal can be done along this particular line. I understand there is an organization in the United States studying this question at the present time, and it is awaiting the decision of those who have been particularly interested in it that we in the Province of Ontario have not included in our laws any fixed form of signals, rather desiring that you will develop something of a uniform character that will in all likelihood suit our conditions, and then we will be pleased to adopt it and be one of ourselves as far as that is concerned.

There are a good many different phases of the situation. I attempted last session, as a private member of the House, to secure a law that would require lights upon all vehicles upon the highway, but my farmer friends who were in large numbers in the House at the time couldn't see it eye to eye with me, particularly as we were approaching the general election and they didn't feel like going back and telling their constituents what had been done in the legislature in its last session. Consequently we did not have put on our statute books any laws requiring lights on horse-drawn vehicles, except there is power given to the cities to pass by-laws requiring that within their own municipal boundaries.

LICENSING OF DRIVERS

We have been discussing the licensing of all drivers. That has not been made part of our law for the present time, but I am satisfied it will be the law. I think it is the law in some parts of the United States. It is bound to come in the end, because in the administration of the law and in the punishment of offenders it will be essential that the offenders' records as motorists should be known. We look forward to having, and in our present legislation we have, some forms of penalties that become cumulative, that the first offense is not as serious as the second offense, but as the offenses accumulate and pile up against the offender, the punishment increases. We are looking forward to that in an endeavor to bring our rash motorists to terms, and I am pleased to say that there are only comparatively few, but they drive so fast and so recklessly that they come in contact with a large population every day, and consequently they are a great menace, and they will be handled effectively as a consequence of the law.

In the administration of our highways in the Province we are doing all we can to eliminate the danger of accident on the highway, particularly collision between motors and other vehicles. Our guard rails, which are essential to the turn-pike where there are deep ditches on the sides, are now equipped with a cable anchored at the end of the guard. We have had innumerable cases in the last two or three years where serious accidents have been avoided because no matter with what force a motor drives against a guard rail with a wire cable anchored to it, it is not possible for the machine to get off the highway; it may break a portion or a section of the posts off, but the cable invariably throws the car back on the road and avoids many serious accidents and sometimes fatalities. We feel that this has done a great deal to protect our motorists on the

highways during the last few years, and we have spent a lot of money on the elimination of sharp turns and the elimination of grade crossings, not only by separating grades, but often by deviating the road for a mile or two where a highway is proceeding largely in the same direction as the railroad. We have cut out two crossings in a great many cases, placing the highway along the railroad instead of crossing and recrossing.

We have trimmed trees and other obstacles that have spoiled the view, giving a clear vision of railroads and dangerous crossroads, and a great many other similar ideas are being developed with the idea of taking care of the motorists on the highway. Where reasonable care is exercised we feel that a great deal of loss in human life that has been all too apparent to the whole of America in recent years will be entirely overcome.

EDUCATION IS GREATEST FIELD

I think possibly we all agree that the greatest field in all our safety endeavors is that of education. In our own Province we are doing, and I suppose you are in the United States, a great deal in the way of educating the boys and the girls in the common schools, reaching them at an early age, teaching them the value of thinking before they act, protecting themselves no matter what they are doing. I like to think that this educational field of endeavor is the greatest, not only because you are reaching every boy and girl, but because you will develop an idea among society generally and it will go on from year to year and have a cumulative value in years to come. I am satisfied that a great deal will be done by having the individual's mind so trained that care will be taken, that thought will be given before anything is undertaken, that the child will look both ways on the street before he crosses over, that the motorist will be constantly on guard to protect the pedestrian, and that we will all use our minds which have been given to us for that purpose to protect ourselves and to protect those around us.

KEEP WELL PEOPLE WELL

ROBERT CAROTHERS, M. D., CINCINNATI, OHIO

A committee of the New York Academy of Medicine recently made a thorough physical examination of nearly 1,000 persons of all ages, wage earners of both sexes and all races. It resulted in finding only 2½ per cent perfectly normal and healthy. Twenty-five per cent needed hygienic or social advice and 72 per cent were in actual need of medical or surgical treatment of some kind. None of these people were really sick in the true sense of the word. They thought themselves in good health and were working, but doing so more or less handicapped.

If we are to take the above findings seriously, the slogan should be "Get people well and keep them well." Check up the machine as we do our automobiles and keep it in the best possible condition.

Physical inventories, such as the above, are being made in factories, advanced schools, gymnasiums and many places in this country with about the same findings. Is it any wonder, then, that we are being aroused to action and our interest in health quickened?

What is health? It is wealth, our greatest possession, the ability to keep well, the power to throw off disease—for the germs of disease are always with us—the ability to recover quickly and completely from injuries or disease, the complete absence of physical defects. Health speaks for the best that is in man—energy, thrift, frugality and efficiency. The healthy man is sane and honest. He meets his responsibilities; he is a good citizen and a good friend.

We have no assurance that health will be perpetual. Disease, the enemy of health and the embodiment of the devil, is constantly with us in some form and demands the intelligent opposition of preventive medicine.

Intelligence, itself, smothers instinct and causes unhealthful disturbances. Instinct directs us in certain protective lines and our civilized education desires differently. The working man eats quantities of roughage, such as cabbage, potatoes and turnips. He works hard and is a stranger to overweight and constipation. The office man prefers easily digested, fat producing carbohydrates; he avoids walking when he can and is habitually constipated.

THE FALLACY OF CARELESS PERSONAL HYGIENE

Ignorance of or carelessness in personal hygiene is probably one of the most potent causes of ill health. Sanitary surroundings with a clean body and a clean mind add greatly to one's health and happiness. This is being impressed upon the school child, the factory worker and the public generally through magazine and newspaper articles.

Nutrition is one of the most interesting subjects of today. The biochemist in animal experimentation has demonstrated many curious problems and has proved the cause and effect of the good and the poor foods that we eat. Manufactured breakfast foods with the beautiful pictures on the billboards are excellent commercial possessions while old fashioned oatmeal with brown sugar and real cow's cream helps to make big, strong children.

Milk should be the basis of everyone's diet. Every man, woman and child should have the equivalent of one quart of cow's milk each day, an abundance of fruit and rough vegetables, a reasonable amount of meat and plenty of whole wheat bread, with appetizers and a few dainties, all conducive to health and bodily efficiency.

Protection from heat and cold by suitable clothing, plenty of pure air and an abundance of the sun's rays, good water inside and out and real food is surely the short road to health. If we could only get away from the complex, artificial life we live and be real, and accept the biblical injunction "food and raiment to thy fancy!"

Though eminently necessary, personal hygiene is not a cure-all nor is it clear sailing for everlasting health. The causes of disease have no respect for age, sex, race, previous condition or social position. The history of humanity is filled with epidemics or the ravages of so-called communicable diseases, diseases conveyed directly or indirectly from one person to another through a definite germ of infection. We are all familiar

with the terrible epidemics of influenza about the close of the war. What is more to the point, however, is how science has fought these diseases and lessened their severity and in some cases, almost eradicated them.

One hundred and fifty years ago the streets of London were peopled with horrible deformities, the result of smallpox. Jenner's discovery of vaccination has made such things unknown. Only a few years ago, tuberculosis in some form was responsible for one death out of seven. Kock's discovery of the tubercle bacillus with a careful study of the course of the disease by many observers has lessened its destructive action, so that we no longer hold it in horror and it is predicted that it will disappear within the next 30 years.

Gonorrhea is probably responsible for more physical and mental unhappiness than any disease known. Blindness in children, sterility in both sexes and premature old age are only a few of its accomplishments. Neiser discovered the real cause, and, if the proper precautions are taken, there is no good reason for contracting this disease. In the years gone by we have filled our hospitals with paretics and many more people, a little more fortunate though greatly incapacitated are made inefficient for life's struggles by the germ of syphilis. Probably no disease has been more thoroughly studied, with the result that a definite cause and a definite cure are known. It can be made preventable with only a little precaution and we are fortunate in having the Wasserman test to check up during treatment and known exactly where we stand. It is to be feared that society is blind to the real value of this work and sees more clearly the disagreeable social side of the problem rather than the value of preventive medicine.

WHAT PREVENTIVE MEDICINE HAS DONE

The stories of malaria and yellow fever are wonderful chapters in preventive medicine. Science found the cause, which is carried by the mosquito and easily prevented when known how. As a result of these discoveries, marshes are now fertile fields with screened houses for the inhabitant and it was made possible to complete the construction of the Panama Canal.

There was a time when Fall and Winter brought its usual epidemic of typhoid fever. It was found that polluted drinking water carried the causative germ and after the sanitary engineer became active, the disease has become much less frequent, though not entirely eradicated.

The parent of 30 years ago looked aghast at the word diphtheria and the sadness and grief which that disease spread was beyond words. How well I remember the first authentic reports of the value of diphtheria antitoxin. It surely brought hope and sunshine to many homes.

There are quite a few localities in our bodies which are exposed to the air and thereby come in intimate contact with disease germs of many kinds, perhaps not so virulent as those just mentioned, but nevertheless capable of setting up a local infection. When picked up by the blood current, the germs are carried through the circulation to internal organs

and locations, causing diseased conditions there. The local infection, such as an ulcer on the tonsil or the root of a tooth, is called the focus of infection and in general terms, we refer to them as focal infections. The teeth, tonsils, nose, throat and ears, with their accessory sinuses, the urethra and the organs of generation in the female are most frequently affected. An infected break in the skin or mucous membrane can act as a focus for internal infection. So long as the blood current is moving, the germs are comparatively innocent, but when they get caught at the end of a so-called end artery (one without an outlet) there trouble may and often does appear. Another source of infection is the loaded and constipated bowel where are stored millions of bacteria in fermentation from which many infectious germs are absorbed and circulated through the body in the blood stream.

The synorrial membranes of our joints for functional reasons have end arteries that are also the habitat of the disease "rheumatism." Diseases of the heart and kidneys usually, and quite likely pneumonia and pulmonary tuberculosis, originate in the same way. Neuritis, appendicitis and gall bladder diseases many times house the same germ found in a diseased tonsil and are surely caused in this manner. Billings has estimated not less than nine distinct diseases that are caused by focal infection. The great majority of these diseases can be avoided if care is exercised in detecting and destroying the focus of infection causing them.

I once knew a woman who had sat in a chair for seven years, unable to do the least thing for herself. Upon examination it was found that shortly before her rheumatic condition had started, two teeth roots which were diseased had been crowned. Otherwise she was in good health. The removal of the crowns and roots, cleaning the diseased local condition of the jaw and a long course of treatment to the joints restored the woman to health and usefulness.

These cases can be reported by the thousands. Sometimes the trouble is with the joints; sometimes with the heart, lungs or kidneys. Diseased appendices and gall bladders are frequent; so also are focal infections.

The human body contains certain ductless glands, the thyroid, pituitary and supra-renal being the principal ones although many smaller and perhaps less important ones are also to be found. Each has its own important functions to perform but work best when acting in unison. They remind one of the carburetor, magneto, generator and starter in an automobile and are capable of giving us much anxiety and trouble when diseased. Disfunction of one of these glands gives rise to definite signs and is easily detected by one trained to do so. Too little thyroid action, for instance, causes inertia, loss of hair and over weight. Too much causes nervousness, sweating, diarrhea and underweight.

It has been learned by experimentation that our environment, food and water are responsible for faulty function. The thyroid gland manufactures iodine for the body which it derives from the food and water we inject. It is important, then, that we eat foods that contain these

necessary ingredients—fruit and raw vegetables. A diseased gland is caused by pressure, malignancy or infectious germs, probably coming from a focus of infection or one of the infectious diseases.

These glands are called endocrines and the study of them endocrinology. The healthy endocrines keep us young and prolong life. It bids fair to become the next great adjunct to medical science, such as anaesthesia, asepsis and the x-ray have been in the past.

AMENABILITY OF CANCER TO CURE

The saddest chapter in all medical literature is cancer. Its onset is so insidious that it is on us with deathly force before we know it. We may carry a cancer for several years without realizing it. Persons in apparently good health have by accident discovered a cancer of the stomach, or, if a woman, in the breast or womb when it is too late to effect a cure, yet no malady is more amenable to a positive cure when recognized and treated early. The cancer of the lower lip is seen and diagnosed at once and almost every one is permanently arrested. When neglected it is just as virulent as those found elsewhere and the deep seated cancers when treated early are as easily cured as those on the lip.

The cause of cancer is no better understood today than it was 50 years ago. We do know that the cases are increasing in number and that many thousands of persons are dying of that dreaded malady every year in this country, most of whom could have been saved. Thorough medical examinations from time to time will discover suspicious nodules, ulcers or scars, frequently the forerunners of cancer, which should be removed surgically. Surgery is by far the best treatment for cancer and when impossible, x-ray and radium are best adjuncts.

Perhaps one of the most frequent unnatural conditions in middle life is high blood pressure, caused by high living and low grade infection of the arteries themselves from some focal infection. It should not be allowed to exist and can be easily avoided if one is properly advised and treated in the earlier years.

These items could be continued ad infinitum, yet people go on thinking they are in good health until one day they find they are really sick with a malady which could easily have been prevented, had it only been known. The only way to determine the status of an individual is by periodic health examinations when he thinks he is well. When sickness does come, the complaint overshadows many lesser defects which might be overlooked.

Every one should select some time in the year when he can best spare the time and arrange by appointment with his family physician in advance. In the larger cities there are medical offices which encourage this business and have the facilities for making competent examinations. In many industrial plants this work has been carried on for some time with great saving in human efficiency. Once a year has been thought sufficiently frequent and one's birthday is considered a good time.

To make the examination complete, every phase of a man's life should be investigated, including family history and physical and mental tendencies, early environment, pleasures, childhood diseases and their effects, present and past habits, how much sleep he requires and receives, the kind of food he consumes, what exercise he takes and its effect. Clothing, the bath and sanitary surroundings are very important.

The careful business man takes yearly inventories of his stock, has his machinery examined to see that it is in perfect running condition. All kinds of insurance are carried, personal and material, and every business safeguard is exercised. Why not, then, be just as solicitous of the working condition of the human machine from year to year?

Through a very active health campaign carried on by one of the large insurance companies at a cost of about two and one-half million dollars, almost twelve million dollars was saved in death claims.

One of the two strongest instincts we possess is self preservation. It is our desire to live to a ripe old age, especially if we are comfortable in body and mind. Age is most desirable when its storehouse is loaded with peaceful and happy accomplishments. Peaceful solidity of well rounded years should be free from pain well past the three score and ten and still be useful. Such is the pinnacle of science through careful study of man and his best care in both health and sickness.

INTERNATIONAL ASPECTS OF THE SAFETY PROBLEM

HON. ROYAL B. MEEKER, COMMISSIONER, PENNSYLVANIA DEPARTMENT OF
LABOR AND INDUSTRY, HARRISBURG, PA.

Americans are prone to boast of the bigness and superiority of things American. We take pride in the biggest production and we are not afraid of comparisons as to quality of our output with that of any other country. We have developed our industrial information services far beyond any European country and we do not hesitate to say so. Our industrial information informed us that we were killing and maiming men in industry to an appalling extent. The Safety Movement and the National Safety Council are the result, and today we stand far in advance of any other country in the world in safety appliances, safety organizations, safety training, safety meetings and everything that has to do with the safeguarding of lives and limbs of workers. We spend more money for safety education and safety motion picture films than all the rest of the world combined. When the International Labor Office set up a Safety Section, largely through my own personal efforts, it looked to the United States as a matter of course for the latest and best practices along these lines. Had the United States been a member of the International Labor Organization an American would have been chosen to head the new Safety Section. The files of the National Safety Council contain the correspondence which I carried on with the officers of this organization relating to the establishment of the Safety Section and its activities. Reference to those files will show that it was the desire of the International Labor Office to bring to Geneva Mr. C. W. Price, who was field organizer for the

National Safety Council at that time, for the purpose of teaching the fundamental ideas and practices of safety as employed in America to the members of the Industrial Safety and Industrial Hygiene Sections of the International Labor Offices. It was the further intention of the office to induce Mr. Price or someone else representing the National Safety Council to make a tour of Europe, or at least of Great Britain in order to preach the gospel of safety to dwellers in darkest Europe.

I refer to this long correspondence, which finally came to naught, in order to show the acknowledged leadership of America in the field of safeguarding, safety organization and training. We lead the world in all this. We spend proportionately, immensely more time, effort and money, than any other country to prevent accidents and to care for the injured worker who gets injured despite all preventive measures. Is not this a record,—an achievement of which we might well be proud? Might not a little boasting of this record be permissible? Perhaps so; but before pointing with pride to our record and indulging our propensity for boasting, let us consider a little just what we have accomplished with our safety campaign. We lead the world by miles in accident prevention. We lead the world by leagues in accident occurrence, and the economic losses due to accidents.

We kill and maim more men per thousand full time workers and per thousand tons of product than any other country. Unless we regard safety work as an end in itself, our pride in doing big things in a big way will be tempered by humiliation when we compare our achievements in the conservation of human life with that of European countries. Alice in Wonderland, by running as fast as she could, just managed to stand still. We safety men and public officials, charged with the obligation to reduce accidents and to eliminate them if possible, by running as fast as our safety first legs can carry us seem to be going backward instead of forward. Pennsylvania has no accident rates, either frequency or severity rates. It is therefore impossible to know accurately whether or not accidents are more frequent and cause greater time losses now than in 1916 when the Pennsylvania Workmen's compensation Law went into effect. The accident records are most disquieting. Doubtless more men are employed in 1923 than were employed in 1915. To offset the greater numbers of employees in part if not in whole is the shorter working day. He would be a bold statistician who would interpret the industrial accident figures of Pennsylvania so as to give comfort to the Safety man. If accident frequency and accident severity have decreased since 1915 we cannot prove it, nor can we prove that they have not increased.

FATALITY RATES IN U. S.

We may console ourselves if we are of a cheerful disposition by figuring out how many more workers we could have killed and maimed in industry if we had not started the safety movement. However, the experience of European countries rises up to mock us. These countries, except Germany and Great Britain, with little or no safety instruction, have

much better accident experience than we. The accident statistics of no two countries are strictly comparable,—for that matter the accident statistics of no two States of the United States are strictly comparable. Nevertheless making all reasonable allowances for discrepancies due to the different methods used in gathering and compiling accident statistics and for the difference in the basic material, it seems probable that in 1920 coal mining in the United States killed about three and a quarter times as many workers per thousand full time employees as coal mining in Great Britain. More disturbing than the appallingly greater fatality rate is the fact that the relative fatality rates, though fluctuating rather widely, show on the whole a decided increase. The incomplete and incomparable statistics of coal mine accidents issued by the United States Bureau of Mines and the British Department of Mines are compared in the International Labor Review for January 1922. The fatality rates per 1000 workers for the United States and for the United Kingdom are as follows:

FATALITY RATE PER 1000 WORKERS

Year	United States	United Kingdom
1913	3.73	1.55
1914	3.22	1.08
1915	3.09	1.36
1916	3.09	1.32
1917	3.56	1.34
1918	3.38	1.39
1919	3.03	.94
1920	2.92	.88

These figures, though not accurately comparable, do show beyond possibility of contradiction an appallingly higher fatality rate in the United States as compared with the United Kingdom. When we make comparison on the basis of the tonnage output, the figures show a lower fatality rate in the United States than in the United Kingdom per thousand tons of coal mined. This is as would be expected because of the much greater use of machinery in mining in our country and the generally much richer and more accessible coal measures. We must not hastily assume that a low accident rate per thousand tons of output is a favorable accident rate. Quite the reverse is generally the case as it is in this example. The low fatality rate per thousand tons is due to the fact that human lives are sacrificed to the God of Big Output. Men are not merely machines to be worked to their limit with the object of producing the largest possible output before the man-machine is worn out or smashed to atoms. To measure deaths and disabilities of workers on a tonnage basis is utterly erroneous and bad statistics. The only just and accurate basis of reference is the man hours worked, during which time the workers were exposed to the hazard of industrial accidents. Throughout my connection with the International Labor Office, I endeavored to promote the acceptance of this plan of presenting accident statistics among all members of the International Labor Organization just as I labored to secure the adoption of this plan in the United States and Canada while I was United

States Commissioner of Labor Statistics. We can't know whether we are progressing, retrogressing or merely digressing in our accident prevention work until we get our statistical standard and bases of comparison uniform and right.

It is greatly to be desired that the accident statistics of all countries should be much improved and standardized so as to make it possible to compare the accident rates by industries and occupations. This is one of the important jobs I started to work upon shortly after I took charge of the Research Division of the International Labor Office. It will take years to work out and establish standards for the compilation of accidents statistics and it will be many more years before the different countries will be able or willing to adopt the standards agreed upon. Nevertheless a beginning has been made. The first conference of labor statisticians which was arranged for at my insistence, will meet in Geneva the first part of November next, to discuss the problems connected with the collection, compilation and publication of the statistics of labor. Accident statistics is one of the items on the Agenda.

PURPOSE OF INTERNATIONAL LABOR OFFICE

The International Labor Office was created primarily for the purpose of improving the conditions of labor in all countries and of equalizing these conditions by bringing the labor standards in backward countries up nearer to the level in the more advanced countries. Some American opponents of the International Labor Organization have condemned the organization as an attempt to destroy our American standards of labor and living, by bringing them down to the level of European or even Asiatic and African countries. Part XIII of the Peace treaty, which is the Magna Charta of the international labor organization, contains a special provision against this very thing. It is provided that no country shall lower its standards in order to conform with those adopted by the International Labor Conference for the less highly developed countries. The International Labor Office is constantly on the alert to discover whether any unfair advantage is possessed by a backward country by reason of lower labor standards which would enable that country to exploit woman and child labor or other so-called "cheap" kinds of labor. The publication by the office of information on industrial and labor conditions in all the different countries is a powerful influence to bring about better and more nearly equal standard conditions.

In the field of industrial accidents it seems that the United States has nothing to fear for its high standards, for no country of the world has such high accident frequency and severity rates. What has been shown regarding our higher accident rates in coal mining holds true in all other industries and in street accidents. In no line do we outdistance Europe more emphatically than in the killing and maiming of men in industry and on the public highways. It is a bit anomalous for the nations of Europe, through the International Labor Office, to appeal to America, the greatest industrial killer, to send over apostles of Safety

to teach them how to save lives and limbs in industry. America is however a land of paradoxes. We do lead the world both in accident prevention and in accident production. Perhaps we excel in the art and science of telling others how to prevent accidents because we have so many accidents to give us practical studies in prevention. It is difficult to account for the higher accident experience in the United States. It is due partly to the emphasis placed on highest speed in production, partly to improper lay out and construction of plants, partly to the heterogeneous mixture of nationalities and races in our industries, but most of all to a spirit of recklessness on the part of masters and men alike. This is, of course, in considerable part a result of the demand for big production. We Americans are, however, by reason of our environment, chance takers and the workers in our industries manifest the gambling spirit in their work and in their play.

Europe has been greatly impressed with the practical work done in America in the prevention of accidents and the care of injured workers. Even India, Japan and China are taking note of what we are doing along these lines. The European industries desire to learn more of our methods and practices. If Europe with her lower accident rates, feels that she can reduce them still lower by learning and practicing our methods, American officials and safety men should feel encouraged to put forth greater efforts to bring our accident rates down so that a public official from an American State will not be suffered with blushes every time he is asked to explain why our accident rates are two or three times higher than the rates in Europe, while we are teaching European industrialists how to lower their rates still further. The efforts of the International Labor Office to make the best methods of accident prevention known throughout the world deserve the hearty support of every right thinking person. If the office did nothing further than to direct the efforts of citizens in all countries to the importance of accurate and complete accident statistics, and to the lessening of the number and severity of such accidents, it would be worth more than the total cost for maintaining the Office.

STUDIES OF INDUSTRIAL DISEASES

Accident statistics and accident prevention are, however, only two parts of the whole industrial health program of the International Labor Office. Studies on an international scale are being made by the office of industrial diseases and poisons and the best methods of prevention as shown by the experience in different countries. In the latest reorganization of the International Labor Office, I am informed that the Safety Section and the Industrial Health Section have been combined. I had, from the beginning, pointed out the oneness and inadvisability of industrial health and safety and had opposed the creation of a separate Safety Section. I have always held that it is just as unhealthy for a blast furnace worker to fall one hundred feet from the top of a furnace and light on his head as it is for him to breathe carbon monoxide until his breath ceases. It makes no difference to the worker or his depend-

ents if he loses his hand by means of an unguarded gear or loses the use of his hand by means of mercury poisoning. The house painter who falls thirteen stories to a cement pavement suffers from imperfect industrial health just as much as though he had followed the normal career of house painters and passed out by the slower and more usual routes of chronic lead poisoning and tuberculosis. I think the common practice in our larger and better organized plants of keeping industrial safety and health in a single department is the only sound practice. I am glad to learn that the International Labor Office has recognized this and that in future we may expect better co-ordination in the international studies of both industrial accidents, diseases and poisons.

I wish to refer in passing to another piece of research and compilation which I started at Geneva. The industrial physicians present are of course familiar with the list of industrial poisons prepared by Doctor Sommerfeld in collaboration with Sir Thomas Oliver and Doctor Putzeys which was later revised by Doctor Sommerfeld and Doctor Fischer and published as Bulletin 100 by the United States Bureau of Labor Statistics. This list of poisons never was complete or entirely accurate and it has become antiquated almost to the point of obsolescence. I made many attempts while United States Commissioner of Labor Statistics to revise this list by bringing it up to date, including industrial diseases, and arranging it by industries and occupations as well as by the names of the poisons or diseases. I was never able to get very far in this much needed revision. I made another beginning while I was Chief of the Research Division of the International Labor Office. I do not know whether much progress has been made since I left Geneva, but at least the program has been submitted and accepted and it is now a question of funds and personnel to carry it into effect. It is highly fitting that this important work in the realm of international industrial health should be undertaken by the International Labor Office which was created for the very purpose of ameliorating the conditions of labor along all lines in all countries.

UNEMPLOYMENT

I cannot leave the consideration of the international aspects of the safety problem without some brief mention of the most important and the most destructive of all industrial hazards. The hazard of unemployment is not even considered an industrial hazard at all, although it is more truly an industrial hazard than any accident causing a physical wound or injury. One can break his finger putting up a shelf in the kitchen; he may break his leg while walking quietly along our peace infested streets and falling into the excavation for the new sewer; he may contract anthrax from an innocent looking shaving brush in the privacy of his own bathroom; he may be killed by carbon monoxide generated by his own private tin-Lizzie; he may be killed or injured in a thousand different ways wholly unrelated in any way to industry, but he can be unemployed only by being industrially unemployed. Unemployment then is the only true industrial hazard. It is

also far away the most prevalent and the most detrimental of all industrial hazards. In periods of industrial crisis and depression, unemployment numbers its victims by millions whereas physical accidents affect only thousands. The demoralization of workers due to unemployment and, what is perhaps as bad, the fear of unemployment can scarcely be exaggerated.

The International Labor Office has, from the beginning of its existence, recognized the transcendent importance of unemployment as an industrial hazard, and has devoted much time and expense to the study of the amount of unemployment, its incidence, the results, the causes and the suggested means of ameliorating or preventing it. The serious study of all the influences and forces related to the facts, the results, the causes and the proposed cures for unemployment goes far beyond the field of labor and industry. It goes to the very foundation of the existing social, political and economic order in all countries. The questions of currency, banking, credit and finance must be considered thoroughly in such a study, as well as the problems of production, distribution and marketing of raw materials and finished products, the migration of populations, business methods, taxation and tariff systems, export duties and every other matter concerning the economic organization and life of nations and peoples. Such a study was, of course, far beyond the power and the limited resources of the International Labor Office. The League of Nations was, at the bottom, more nearly concerned with most aspects of this study. The Economics and Financial Section of the League Secretariat sent out questionnaires to all governments asking for much of the information needed in this study. Both the Council of the League and the Governing Body of the International Labor Office, recognizing the importance of the study and the necessity for co-operation in carrying on the study, instructed these two international organizations to undertake the investigation in co-operation. This joint study was begun by the Research Division of the International Labor Office and the Economic and Financial Section of the League Secretariat about a year ago. No published report has yet been made so far as I know. However, an article entitled "The Controlling Factor in Trade Cycles" based upon information secured in the course of his research has been prepared for private publication by Mr. J. R. Bellerby, one of the young men of the International Labor Office who has been engaged upon this study.

I do not expect a very important real contribution to the understanding of the causes of and remedies for unemployment will come out of the first preliminary attempt to study the problem internationally. I do rejoice, however, that there exists in the world today the League of Nations and the International Labor Organization,—official, public international agencies,—charged with the duty and vested with authority to make upon an international scale this investigation into unemployment as well as any other investigation having a bearing upon the forces which

make for discontent, misunderstanding and war. I am proud that I had some small part in originating and organizing these indispensable international institutions which have been created for the benefit of employers, workers and the rest of the people of the whole round world.

INDUSTRIAL SAFETY

R. L. REDPATH, GENERAL MANAGER, AMERICAN RADIATOR CO., BUFFALO, N. Y.

In looking around for some sort of a motto or name that would express what we were looking for in our safety work, I came across this: "Our aim is that our workmen shall live to enjoy the fruits of their labor, that his mother shall have the comfort of his arm in her age, that his wife shall not be untimely a widow, that his children shall have a father, and that cripples and hopeless wrecks who were once strong men shall not longer be a by-product of industry."

I think that very well expresses the ideal that we are striving for in our safety work, and I think that will correspond very well with your ideas of this work. The safety movement is one of the greatest constructive movements of modern times. It is as wide as the world.

Very much has been said in recent times in regard to the elimination of waste in material, the elimination of waste of time. Great sums of money have been spent by corporations in recovery of waste from their dumps. How much more can be accomplished by recovering the waste that is going on continually through accidents in industry!

Using an automobile term we might say that the present civilization is going in high. The automobile, one of our most recent inventions, has been said by some to be the instrument that divides between the quick and the dead. Some of us who looked at these photographs that were shown on the screen this afternoon can readily realize that in the congestion of traffic we saw one would have to be rather nimble in order to get away.

In the handling of materials in our plants, in the handling of our processes of manufacture, we are using every mechanical means possible in order that we may speed up, in order that we may be able to produce as we wish to produce in the face of a shortage of labor. These machines are all more or less dangerous unless they are properly protected and unless the operators and the employees who work beneath these cranes and around these machines have had proper instructions as to being careful.

To my mind there are three fundamental reasons for the National Safety Council. The first is that we have grown to be a nation of one hundred and ten or more millions of people. The second is that the workshops throughout the country are turning out machinery as fast as may be to take the place of labor or to perform new operations that occur in industry. The third reason is that within the past twenty-five years or thirty years we have become an industrial nation rather than

an agricultural nation. Another reason is that we have become a nation on wheels, and it is said that even the farmer today will not buy anything that he can't sit on.

It seems to me that we are better able to control accidents in industry than perhaps in any other line, because we are more or less of a law unto ourselves. We are able to definitely provide means for the reduction of accidents.

MORAL AND FINANCIAL PHASE OF SAFETY WORK

I want to discuss this question in two phases. The first is the moral or the humanitarian phase, and the second is the financial. It seems to me in taking up the first phase of the question that if I were a preacher and wanted to preach a sermon on this subject, I would take for my text "Am I my brother's keeper?"

When I went into an industrial plant about thirty years ago, the first plant of which I ever had charge, there was a young man there whom I knew very well. He was working in the machinery department, and one day it happened to fall to his lot to put on a belt. Without shutting off the power he went up a ladder and taking a hammer handle, as was usual in those days, attempted to throw on the belt. His arm was caught and he was whirled several times around the shaft and finally landed on the floor with his arm off. From that time I have become thoroughly converted to the idea of safety work, and I have been working at it ever since.

The first thing in introducing safety work in a plant, I should say, would be to convert the proprietor. The next thing to do is to convert the manager of the works or the superintendent or the various superintendents; and the next thing is to convert the foremen and lastly the workmen.

I want to say to you gentlemen that there is nothing on earth that will convert men to the safety movement so well as to some day go into the First Aid Department and see there a man who has been seriously injured through perhaps an unguarded machine or something that could have been avoided, and then get into the ambulance and go with that man to the hospital and wait there until the family come in, and witness not only the pain that that man is undergoing but the grief of the family. Do that and I say to you you will be converted to the safety movement.

Accidents, to my mind, divide themselves into two classes; first, accidents that might have been prevented by proper safeguarding of machinery, and second, accidents that might have been prevented had the employee used proper care in his work.

Under the first heading, for example, an accident occurred in a plant where I was in charge one time when an unguarded emery wheel burst. The man suffered very severe internal injuries and lost his right arm. In another case an unguarded belt caused the loss of a life.

Considering the second phase, the carelessness of the employee, there occurs to my mind a process where we were handling castings through the plant. Three hooks were provided for hooking these castings on to the crane. Two of the hooks were engaged; the other was not. The castings were lifted up and fell and the man lost his life.

In another case of this kind where a saw had been properly guarded, the workmen had gone home and the foreman wanted to do some work on that saw. He removed the guard and pushed a piece of timber through that saw. It kicked back, struck him in the abdomen, and he died in about five hours.

Another case was that of a man who should have known better who was pouring molten metal on to a wet floor. The result was an explosion which caused him the loss of an eye.

One might go on with innumerable cases of this kind. One of the most distressing things that occurred lately was the case of a man who got a scratch on his finger. He paid no attention to it, disregarded the instructions that the foreman had given to all men to report to the First Aid Department immediately, and in the course of about two days inflammation set on and we did not know where he was; we found out the second or third day afterwards, and rushed him to the hospital. He died on account of that scratch because he didn't take care of it.

MUST CONVERT SELVES FIRST

If we can convert ourselves to the necessity of properly guarding the various operations, then we can tackle the larger task of converting the workmen to this proposition of safety, and it is going to be a large task and a long one. It takes a long time to instill into the minds of your workmen that they must cooperate with you in these matters.

Just a word as to the financial side of this subject. The expense of accidents must be passed on to the consumer. There is no other way. If an accident occurs in a bakery there is nothing to do but increase the cost of bread; if it is on a street car, it must come out of the fares paid; if it is on a railway, perhaps it means an increased freight rate or passenger rate; if it is in a steel mill, it will certainly show up in the price that is charged per pound of steel, which naturally makes this question of safety one of tremendous public concern.

There are some local statistics that I have here in regard to Buffalo that I would like to read. Eleven Buffalo firms with 31,250 employees expended a total of \$791,000 to cover accident insurance premiums, first aid, hospital expenses, outside hospitals, medical specialists' fees, and the cost of safety administration. There are about 160,000 employees in Niagara and Erie Counties, including Buffalo and the Niagara Frontier. The cost figure could be conservatively multiplied by five, making a total of upwards of \$3,000,000, the cost of these accidents. Not only would the cost of accidents be prevented but the cost of all the misery that goes with it could be prevented.

There are three fundamental lines that we are endeavoring to follow in our accident work. First is to guard all machines that can be guarded; second is the educational features; third is the medical work. I have not time to go into these subjects separately, but I just want to call your attention to the fact that if you take the first letters of each one of these subjects you get the word "G-E-M." You have guard, education and medical, and if you gentlemen can succeed in cutting down to material extent if not entirely eliminating the accidents in your plants, it will be one of the brightest gems that you ever wore in your crown.

SHOWS REDUCTION OF MORE THAN HALF IN ACCIDENTS

Just a word in regard to our experience in accident work. As I said before, we have been engaged in this for a great many years. We did not keep actual records of our experience until the beginning of 1920, when we organized our Safety Bureau, but the records for these three years of intensive work show that we have reduced accidents through our various plants an average of 21 per cent. Some plants, however, have reduced as high as 70 per cent.

We are not proud of our record at all; we are pleased that we have been able to make this reduction, but our work is going right on, we are becoming more interested in it all the time, and I believe the greatest result we are getting is from the education that we are able to carry through the manager, through the superintendent, through the foreman, and down to the workmen.

I believe that through their safety work we have been able to get a much better feeling among our employees, and we do know that we have reduced the moral obligation which we feel in the conduct of this institution.

Incidentally, we have reduced our compensation costs. That is an item to take into consideration, too, and it is interesting to note it here. This work has been done during times, as you all know, when the labor turnover has been very heavy, and when there is a heavy turnover of labor the accidents are very much more noticed.

Just a word as to the system which we are following. In beginning our work in 1920 we selected a first class safety man; second we started out again with an intensive campaign to convert our organization. One of the principal things when you are taking on a new man, when you have a large labor turnover, is to teach the man his job. Don't just turn him loose on it, but teach him what he is to do and show him the dangers of his job.

We have organized committees. One of the worst things we experienced in getting our safety work across was the fact that if we had one committee in a plant they didn't have time to make an inspection of a plant. In order to get away from that objection we have appointed a separate committee of five men. These are superintendents and foremen. In each department, the plant being divided into zones, we have a number

of inspectors, usually three. When the day for inspection comes along, which is every two weeks, one of the men from the central committee goes to one of the departments and makes the inspection with the local committee and brings back the report to the central committee. The central committee have their meeting with the managers, at which all the reports are reviewed. Each accident that has occurred in the plant during the two weeks preceding any meeting is reviewed by the management with the Central Committee, and the management has to be assured that everything has been done to correct the situation that might have caused such an accident.

We have sent to our central office monthly reports from each of the various plants showing the line of action, whether it is increasing or decreasing, these being compared with accident reports for previous years. Together with this accident prevention work we carry along sanitation and ventilation as well as heating and good housekeeping. We believe that all these things go together.

I think one of the most important things in this safety work is a first class medical department. We all know that, do as much as we may to prevent accidents, we do have accidents, and if becomes necessary to take care of them. We must take care of them properly in the first place and follow them up until a cure is effected.

CAREFUL CROSSING CAMPAIGN

H. A. ROWE, CLAIM ATTORNEY, DELAWARE, LACKAWANNA & WESTERN

RAILROAD CO., NEW YORK CITY

The prevention of highway crossing accidents is recognized as part of a broad subject, but lends itself to special effort. That there was need for action and that effort has been made by the railroads of our country under the direction of the American Railway Association, to reduce railroad-highway crossing accidents, is manifest to all observers.

In 1898, when the pedestrian, the cyclist and the horse drawn vehicle were the only users of our highways, there were but 657 fatalities and 1123 injuries at all of the railroad crossings in our country, and these were regarded as almost necessary evils attendant upon the conduct of our commerce. At that time we had about 16,000,000 horses and mules and it may be drivers in those days had the advantage of horse sense.

The advent of the motor car, however, has developed hazards of travel in its wake so that fatalities at railroad-highway crossings in 1922 were 1810 and the injuries 5383. During the first three months of 1923 the fatalities increased 35 per. cent and the injuries 46 per cent over the same period in 1922. If this be indicative of what may be expected as the year's result, there will be approximately 2500 deaths and 8000 injuries during the present year.

On December 31, 1922, there were registered in Continental United States, 12,357,376 automobiles and trucks and during the first eight months of this year, 2,708,000 automobiles were manufactured so that we have approximately 15,000,000 cars in use at the present time, or one to every seven of our population.

These figures are sufficient to indicate the situation and to impress upon us the need of action towards the curtailment of crossing accidents.

According to our individual bents we are interested in the prevention or reduction of crossing accidents by various motives. Few can escape the sighs of sadness upon hearing or reading of those who have been unnecessarily sacrificed in such mishaps, nor can we escape the sympathetic touching of our heartstrings when we dwell upon the pain, the anguish, and mutilation borne by those who may survive, but pay a substantial penalty for someone's carelessness at the railroad. For humane reasons alone, all well disposed persons should end their very best efforts to a diminution of the risk of such accidents.

As citizens, cognizant of our duties to each other, we ought to demand competency and care from auto drivers equal to that which is demanded from engine-drivers. No railroad company would for a moment permit a train containing passengers to be operated over its lines unless sure the engine-driver had substantial experience, was thoroughly qualified from the physical, mental and operating standpoints, and in addition the engineer is disciplined for infractions of stern rules, but no such safeguards are thrown around auto drivers, who also transport passengers.

Notwithstanding the fact that practically all crossing accidents in certain states become simply an assessment of damage by injuries, I know from experience that railroad executives are actuated in their espousal of crossing accident prevention by a higher motive than the avoidance of the payment of money.

It is time that we endeavor to curb these ever increasing mishaps or the annual toll of casualties in the next five or ten years may be a severe arraignment of our lack of forethought or our indifference to the loss of human life.

MEANS OF ATTACKING PROBLEM

There are several means by which we may attack the problem of railroad-highway crossing accident prevention, one of which may be called engineering. The elimination of the crossing by separation of grade is the absolute solution of the problem. In considering it, however, we are instantly confronted with two elements which are practically insurmountable. One is the element of time.

On the 31st day of December, 1922, there were 256,362 grade level crossings over Class I railroads operating within the United States, after deducting 705 crossings which were removed that year. At the rate with which crossings have been eliminated in the last five years, it will take about 600 years to remove them and though the matter of elimination be speeded tremendously, we are safe in saying that generations of time are involved in their ultimate disposal.

It is, of course, proper that crossings in dangerously congested areas be first selected for removal, but the futility of expecting a great reduction of crossing accidents from such eliminations arises when we recog-

nize that most of our crossing accidents occur in rural communities where the travel upon both railroad and highway is comparatively light and frequently where the view of approaching train is most excellent.

There is the element of cost, which makes elimination by separation of grades prohibitive. Competent engineers say that taking the crossings of our country by and large, a reasonable estimate of the cost of removal in rural and urban districts would approximate not less than \$50,000 per crossing. Upon the road I have the honor to represent, we have just completed the elimination of fourteen crossings in the City of East Orange, N. J., at a total cost in excess of \$3,250,000, or more than \$230,000 for each of the fourteen crossings. In ten years we have removed 150 crossings at an average cost of \$96,600.

As there are over 250,000 of such railroad highway crossings in our country, it is a simple matter of arithmetic to ascertain that the cost of separation of grades, would be in excess of \$12,500,000,000. What is \$12,500,000,000? We speak of billions today as glibly as we spoke of millions before the war. Twelve billion five hundred million is more than one-half of the entire public debt of our country. It is two-thirds of the estimated value of all our railroad properties. It is almost twice the total deposits in all our savings banks. It is \$125 for every man, woman and child in our land. It is beyond our comprehension. Such a stupendous amount would vastly increase the cost of transportation and would impose very substantial burdens upon tax payers in their respective localities. It would be non-revenue producing and almost impossible of obtainment. Interest alone would call for \$750,000,000 per annum.

THE PRACTICABILITY OF TURNOUTS

It is evident the problem in its immediate aspect must be approached from another angle. Possibly by considering engineering from different viewpoints we can see how an improvement could be attained. For instance, by the establishment or rearrangement of highways so that they are parallel with the railroads, instead of permitting such highways to cross and recross the tracks. Many crossings can be removed thusly at a minimum of expense.

Island turnouts are in use upon some highways requiring the driver to deliberately turn at right and left angles, reducing his speed, and affording him opportunity for observation before passing over railroad tracks. This system is suited to specific situations only, requiring broad highways and light traffic, and is not free from other objections.

Your attention is directed to the plan of the American Railway Association of uniformly and clearly designating approach to a railroad crossing. The average driver keeps his eye glued to the road and observes little at his right or left. This plan, therefore, consists in the marking of the highway itself at a point about 250 feet from the intersection with the railroad track with two broad, white, painted lines about five feet apart, with the letters "R. R." between the lines. This is definite notice to the driver that he is approaching a railroad crossing and gives him

opportunity to exercise caution and care. At a point about 150 feet from the railroad crossing, there should be marked a single broad, white line across the highway, which is further notice to him of his approach to a danger zone. There is a third line either painted red or marked with a cross bar being approximately 25 feet from crossing, and gives him positive knowledge of his presence in a zone of danger, but still safe if precautions have been taken. This plan has been submitted to the Chairman of every State Highway Commission in the country and more than twenty of them have already signified their intention of adopting the system or of trying it out in specific places. It might well be considered by county and local authorities. Perhaps it will be helpful in accomplishing our end.

Engineering should include the removal of unnecessary obstructions to view—the maintenance of present crossings in good order for travel—the construction and operation of mechanical barriers at crossings such as the standard, the flexible and the rigid crossing gate. You are familiar with our standard gate. It is a warning and not a barrier. The flexible gate is a collapsible affair which is supposed to hold in a “V” shaped vise-like grip anything which comes in contact with it. The rigid crossing gate is best exemplified by the illustrations upon the Long Island Railroad at Long Beach, where a pivoted telegraph pole has been utilized as a gate. It is said that the same automobile never collides with this gate twice.

There is also the installation of various forms of visual and audible signals including what is known as the automatic flagman, or wig-wag and the flashing lights. These systems of protection I regard as vastly superior to manual protection. They seldom fail and operate twenty-four hours a day.

In their efforts to do their full duty in the crossing situation, railroads are paying particular attention to the equipment of their motive power with efficient whistles, bell and headlight, extending the crossing whistle to nearly eleven seconds, and we are watching employees carefully to be sure these means of warning to drivers are being employed intelligently and faithfully.

So much for that side of the crossing problem. Let us consider it for a moment from another angle, which we will call, education.

EDUCATION OF AUTO DRIVERS

It is believed that in the education of the automobile driver to the exercise of a high degree of care and the insistent demand on the part of his passengers, whether paid passengers or guests, that he no longer gamble with their lives, we have put our finger upon the spot where the immediate remedy lies. It ought not to take many such illustrations as were ours on that fateful Sunday, the 29th day of July, when ten crossing accidents resulted in the death of 36 persons and on two occasions recently when nine persons were killed in single crossing mishaps;

and one instance where 15 out of 19 persons were killed in a bus collision, to impress upon the driving public the responsibility that is theirs for the lives of others. In the same connection it might be mentioned that in 1922, 16 persons were killed and 125 injured while riding as passengers in trains, due to automobile collisions at crossings.

There should be strenuous and continuous effort made to impress the wild, defiant, thoughtless or silly driver that regardless as he may be of his own fate, the biblical injunction still stands against him, "Thou shalt not kill."

I shall not go into a review of the plans pursued by the Committee on Prevention of Highway Crossing Accidents, as you are all familiar with our conspicuous poster in its many forms and with the information that has been put out from time to time, and which has been so generously and so broadly heralded by the press of our country and by distinguished publicists. May they be encouraged to keep up the good work.

I have told you some of the things that the railroads and the automobile drivers must do to reduce crossing accidents. The state has its obligations, also.

As our highways are in such common use today there should be established as nearly uniform traffic regulations as possible and simplicity should be the dominant feature of such regulations. It must be recognized that the intensive use of highways today presents modern problems and we must demand laws, rules and regulations suited to the present use and character of the traffic upon our highways.

Approach to a railroad crossing should be unmistakably indicated and it should be illegal to interfere with, mutilate or represent for commercial purposes railroad crossing designations.

Positive qualifications to operate a car should be demanded and the mere possession of a twenty-second handed car ought not to qualify a person to drive. The license questionnaire should dwell deeply on the need of extreme care. The blind, the near blind, the seriously crippled or mentally deficient should not be permitted to jeopardize their own and the lives of other people.

Authorities issuing licenses should be empowered and required to revoke the license, or deny renewal, for suitable, substantial period in cases of intoxication, recklessness and gross incompetency, etc.

RECOMMENDATIONS

State authorities should be empowered to require a report from a driver, covering every automobile accident within the State. Insurance carriers should also report in order to afford a check upon drivers. A weeding out of the reckless and incompetent would result.

All motor vehicles carrying freight or passengers for hire should be required to come to a full stop between ten and fifty feet from a railroad crossing and not proceed until the way is known to be clear.

A system of police surveillance should be instituted so that efficient traffic regulation may be enforced at every railroad crossing or at least at those highways traversed by more than 250 vehicles within the twenty-four hour period. This means expense but it must be done.

Investing crossing watchmen with police powers should be seriously considered, including the uniforming of such men.

There should be sincere cooperation between police and judicial officers. Reckless drivers should be dealt with harshly until it becomes well known that the safety of others must be respected.

Each state should endeavor to co-ordinate state, county and municipal traffic regulations that plain rules may be established and understood and confusions avoided. As nearly as possible there should be adopted by neighboring states non-conflicting standards.

The automobile manufacturers can perform a valuable service to the driving and riding public by incorporating in the pamphlet of instructions for the operation of cars, clear and positive directions as to the conduct of the driver at railroad crossings, and there should be therein unmistakable warnings against recklessness. Automobile dealers, motor clubs and motor magazines should join in the preservation of the public at crossings. This is a duty owing to the public and it should be fairly met.

In the problem of prevention of railroad-highway crossing accidents, there should be no "passing the buck." Every person and authority charged with the construction, maintenance and operation of our railroads—with the construction and maintenance of our highways—with the enactment and enforcement of traffic regulations—with the manufacture and sale of automobiles—with the training, licensing or employment of drivers—with the ability and facilities to directly or indirectly mould public opinion—every person riding as passenger in an automobile and every driver—should be cognizant of the obligations upon him and should realize his opportunities of minimizing the tragedies of travel, of doing work that is worth while, and of adding to the sum total of human happiness.

Individually and collectively, let us "Cross Crossings Cautiously."

PRESENTATION OF SAFETY FILM

Chairman Botsford: We have reached the conclusion of the spoken program and will proceed to the film.

Mr. David S. Beyer will explain to you for a few moments what the film is, and then the new National Safety Council safety film will be shown.

Mr. David S. Beyer (Liberty Mutual Insurance Co.): This picture that you are about to witness is the first one of three films that are being projected by the Motion Picture Committee of the National Safety Council. It is the first picture that has been produced by the Council itself. The funds have been raised by contributions which members of

the Council, many of whom are present, have given. A question developed as to what kind of a picture we should start with. There have been some very excellent industrial pictures produced already by our good President, Mr. Dow, and a number of other agencies, and while most of our members are interested primarily in the industrial hazard perhaps, we felt there was more need for a film which would treat of the hazards of the home and the street, so the first picture, "Ask Daddy," is along that line. I believe, and I think the members of our Committee all felt, that the safety problem is so largely an educational problem that we ought to try to get the wives and the children on the safety squad, and this picture is an effort to enlist the interest of the wives and children, and we believe if we can make safety a topic at the dinner table and in the schools and in the home, it will react on our industrial problem and the public safety problem in which we are all interested.

The first picture, which will now be shown, is along that line. We hope later to be able to produce one or two industrial pictures which will treat of the various hazards that are found in our industries.

The film "Ask Daddy" was shown.

The session adjourned at 5:45 o'clock.

ADJOURNMENT.

General Session

Joint Session of the American Association of Industrial Physicians and Surgeons and the National Safety Council

October 2, 1923

DR. RALPH ELLIOTT, Chairman

Health Service Section, National Safety Council.

DR. C. E. FORD, Chairman

President, American Association of Industrial Physicians and Surgeons.

CHAIRMAN ELLIOTT: The first number on the program this afternoon is one that we look forward to from year to year, the address of the president. I know of no one that is so well qualified to give us real workable information on industrial medicine as our President, Dr. C. E. Ford, of the General Chemical Company of New York City.

ANNUAL ADDRESS OF THE PRESIDENT OF THE AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS

C. E. FORD, M. D., GENERAL CHEMICAL COMPANY, NEW YORK CITY

So tremendous have been the recent advances in medicine that one cannot grasp more than a small part of them; hence the general practitioner has become more or less dependent upon the skill and specialized training of physicians having adequate knowledge to treat the patient in accordance with the best scientific procedure. Even the layman realizes the futility of individual effort to attain the knowledge necessary in treating the simplest and most common maladies, because of the many complications which experience has shown are adherent possibilities of any disease. Medical treatment has always been in advance of knowledge, and exact knowledge of disease has come later from the results of efforts to palliate or cure the diseases of man. The medical profession has only of late recognized the great practical value of the labors of the physiologist, the physicist, and workers in other branches of science. The organization of departments of trained workers in special fields of medicine and allied sciences has aided greatly in obtaining information which permits an interpretation of all of the facts of the case by the diagnostician and brings knowledge closer to treatment.

Industrial medical practice has become a more or less specialized field embracing particularly traumatic surgery and personal hygiene, or, collectively, sanitation, commonly referred to as preventive medicine. These subjects are of secondary importance in the average general practice. It would be mutually helpful and would rebound immeasurably to the advantage of the community as a whole if the interrelationship existing between medicine and industrial life were more fully understood and acted upon by the whole medical profession. This fact is to no small degree the reason for the existence of the physician in industry. Admittedly it is difficult to define his real function because of the great variety of his duties, which are determined by the administrative policies or exigencies of the particular business with which he is associated.

DEFINITION OF INDUSTRIAL PHYSICIAN

Some time ago the Conference Board of Physicians in Industry promulgated a definition which, while stiltedly expressed, seems to cover the subject, and is comprehensive and intelligent:

The physician in industry is one who applies the principles of modern medicine and surgery to the industrial worker, sick or well, supplementing the remedial agencies of medicine by the sound application of hygiene, sanitation and accident prevention, and who, in addition, has an adequate and co-operative appreciation of the social, economic and administrative problems and responsibilities of industry in its relation to society.

This definition has been buffeted about by destructive criticism, but as yet there has not appeared a better one. Hence I, at least for the present, accept it.

We are amazed at the development and practical use of the automobile, wireless telephony and telegraphy, aeronautics and modern inventions, but nothing approaches the miraculous so nearly as do the fifteen years of added life that have been given to American citizens by the application of life-saving methods through discoveries in medicine, biology, bacteriology, entomology, chemistry, and engineering in its various branches.

The great gain in life expectancy has occurred largely since 1870, at which time life expectancy was 41 years. In the sixteenth century the average length of human life was between 18 and 20 years; at the close of the eighteenth century it was less than 25 years; at the close of the nineteenth century it was between 45 and 48 years; whereas today it varies in different countries from less than 25 in India, where the average is only about 24 years, to 56 years in the United States, and 60 in New Zealand. The general mortality rate in the registration area of the United States has been reduced from 19.8 per thousand in 1880 to 11.6 in 1921. This means the saving of about 500,000 lives for the year 1921 alone. The death rate of the city of Buffalo, was 24.06 per thousand in 1882, and 12.80 in 1922; thus the saving in human lives for the year 1922 was 5,630.

Consider for a moment, if you will, from the standpoint of present security, what would have been the situation if the death rate of the United States for last year had been that of the city of Buffalo for 1882; 1,309,000 more people would have died than did die. This, if expressed in terms of money value, would have meant a loss of \$660,000,000 for the year. Notwithstanding the present seemingly satisfactory state, preventive medicine is far from having attained its possibilities. If the public would apply the present knowledge of preventive medicine, the average length of life could readily be extended to 65 years. Insurance statisticians anticipate an average of 75 years in the not remote future.

THE THREE FACTORS OF LONGEVITY

What is responsible for this social Golconda? There are three major factors: preventive medicine or public health service, modern surgery, and the safety movement. I also wish to state with the utmost confidence, notwithstanding the opposition which is being encountered at the present time, that prohibition has contributed and will continue to contribute its share.

The first of this group—public health service—includes the control or restriction of communicable diseases, the abatement of nuisances, the sanitary inspection of food supply, schools, public buildings, institutions and tenements, the collection and removal of refuse, the registration of vital statistics, the supervision of public and private water supplies, the collection and removal of sewage, the regulation of offensive trades, the control of infant mortality, and child hygiene. All of these subjects have many subdivisions, interdependencies, and ramifications.

Surgery as a science exerted little influence on human affairs until about a century ago—this with all respect to the thorough scientific studies of Galen, Vesalius, Paré, Harvey, Haller and the Hunters; but with the advent of Lister and Morton and the modern contributors to surgical pathology, physiology, diagnosis and operative technic, it has made great progress. Operative mortality has been reduced from appalling figures to 2 to 5 per cent. in general hospitals. Representative examples of procedures in which especial improvement has been made are the treatment of compound fractures and abdominal infections, of which appendicitis is an outstanding example, and the treatment of toxic goiter, a disease of major importance in the Great Lakes Basin, which formerly had an operative mortality of 15 to 20 per cent. but which now has a mortality of less than 1 per cent.

The problem of prolongation of life is a most engaging one, and has enlisted public interest from biblical times to the present day. Among the ancients search was made for some elixir of life, records of which appear throughout history. During the middle ages great value was attached to various concoctions and combinations of drugs, the employment of which was claimed to prolong life and prevent accidents. With the passing of centuries the tendency has been toward the scientific. Scientific knowledge is from a decade to a century in advance of its

adaptation and practical utilization. Therefore, in the course of time there will appear returns from the social disease crusade, mental hygiene will be better understood, and the diseases of middle life, the results of "wear and tear," will be dealt with in simple fashion—namely, by means of the periodic health examination. There is no more valuable measure at our command for the early detection of diseases, especially those in which the onset is so insidious as to permit them to become well established or even fairly advanced before the victims are aware of their presence. In any extensive series of examinations of persons who consider themselves in good health, it is amazing how many defects which appear trivial in themselves but which are really potential morbidity producing factors of most serious import, and how many definite indications of serious disease are disclosed.

The time to prepare for old age is early in middle life. It is at this period that the individual should be so guided and directed that the disease process may be corrected or checked to such an extent that it will not interfere with his productive capacity or cause disability.

It is most striking that old employees, those in middle life, laborers or mechanics, who have held their positions twenty or thirty years or longer, are always physically better than floaters or relatively small time employees. Almost invariably there is a constant ratio between length of employment and physical soundness. These men are clean of mind and body, and neater in attire, however much they may be exposed to the grease and grime of manufacturing processes. They are provident or want to be; they have at least a small bank account, an equity in a home or a lot, Liberty Bonds or a small holding of sound securities. Their children have had high school training, and the family resources are strained to the limit in order that the children may have every available advantage. All this is, of course, to be expected of this fine group of men, whose very fineness makes them a tragic spectacle when overcome by premature disability.

It is and should be a large part of the responsibility of the physician in industry, if he discharges his duty to employed and employer alike, to see to it with the utmost militancy that the uninformed fellow-worker is directed to consult a specialist with regard to his ailments. I say this with a full recognition of the rights of the general practitioner.

SPECIALIZATION IN THE GREAT LAKES BASIN

Let us take as an illustration toxic goitre. In the Great Lakes Basin, Colorado, and the northwest states where this malady is common, the surgeon gains experience in operation and judgment which has resulted in a perfected technic with a remarkably low death rate and almost no postoperative ailment or disability. In other districts in which the operation is only an occasional occurrence, the results seem to be less satisfactory than merely poor technic would warrant. It is therefore probable that there has been a neglect of certain details which have not impressed the occasional operator in this very important procedure. There are

numerous details to be observed in preparing a patient for the surgical treatment of goitre. In order that the surgical risk may be reduced to the lowest point, it is well worth the additional outlay in money and time for a patient contemplating such procedure to be placed in contact with a clinic offering the minimum risk.

The medical charlatan, the pure quack, the advertising faker, the osteopath, and the chiropractor find among wage-earners as fruitful a field as among any other financial or social group. Happily the wage-earner is not the ready victim of Christian Science for, as Dr. Mayo has said, "Not all persons have sufficient imagination to accept the Christian Science jumble. It takes real imagination to reach a hand in the air, bring it down empty and say 'See what I have in my empty hand'."

As was admirably expressed by Dr. George Vincent, the scope of modern medicine is as wide as the range of influences, whether physical, biological, mental or social. Social problems from their very nature compel the serious attention of the industrial physician. The only solution of social pathology as of physical pathology is an intelligent search for the cause and, when found, its eradication, and thus prevention.

It is trite for the doctor to say that the public must be educated when his own education is incomplete. Until recently, at least, organized medicine has made very little concerted effort to give the public guidance in its thought relating to socio-medical problems. Most of the study of recent years has been made and reported by lay organizations or by those promoted by laymen. To a large extent we lack the facts, which are obtained only as a result of careful analytical study by trained individuals.

POVERTY CAUSED BY SICKNESS AND DISABILITY

At the International Congress of Social Workers which was held in Washington during the current year, it was disclosed that three-fourths of the poverty on this continent was traceable to physical and mental incapacity. Various commissions have been studying the problem of sickness and their findings show that in the United States three persons of every one hundred are constantly ill. This means:

1. In the United States and Canada 3,500,000 persons are ill practically every day in the year.
2. Twenty per cent. of the population suffer a week or more of illness during the course of one year. In other words, one person in every five should anticipate at least seven days of sickness every year.
3. On the basis of time lost every year by working people, each person in the United States and Canada loses seven days annually through illness, which means a total of 770,770,000 days every twelve months.
4. The average duration of illness is slightly more than thirty-five days.

5. Families of wage-earners in industrial centers spend \$32 to \$53 a year on account of sickness in addition to gratuitous care in public and private hospitals. Some small conception of this expenditure for hospital service may be had from the records of the city of New York, where it is estimated that \$22,000,000 are expended annually on the care of the indigent.

These figures in their national application assume stupendous proportions. It was further found that sickness was a problem in from 36 to 49 per cent. of the families under the care of the United Charities of Chicago. The Social Insurance Commission of California found sickness to be the primary cause of dependency in 50 per cent. of the families studied. The New Jersey Commission reported that it was the cause of dependency in 42 per cent. of a total of 1,412 families. Sickness was present in two-thirds of 3,000 families assisted by the Charities Organization Society of New York City in 1916, and in 42 per cent. of the families under the care of the Philadelphia Society for Organized Charities during 1916.

Obviously, then, sickness and disability, which are in a large measure preventable, play the most important rôle in the production of poverty. This fact emphasizes the necessity for medical men and public health workers to keep in mind the significance of cause and effect.

A few years ago an investigation was made by the United States Public Health Service covering certain industries of the South. It was found that when the monthly income averaged less than \$12 per person in the family, the sickness rate was 70 per thousand. When the income was \$14 per individual in the home, the sickness rate dropped to 48.2 per thousand. When the income was \$16 to \$20 per person, the sickness rate dropped to 34.4 per thousand; and with an income of \$20 or more per individual, the sickness rate dropped to 18.5 per thousand. Thus it appears that the health of the family is in a measure at least governed by the revenue of the home.

That the industrial physician occupies a strategic position in the solution of the intricate problem of poverty requires no elaboration. When we speak of poverty, we mean the condition in which is found a lack of some of the necessities of life—the goods, materials, and service necessary for wholesome living. Energy is one of the most valuable assets of man, yet this cannot be had without wholesome living. Again it is obvious that sickness and poverty are intimately woven into the social fabric as cause and effect; consequently the effective solution of our social problems in the home rests in no small measure upon the foundation of the prevention of disease. Insufficient revenue means under-nutrition, improper housing, lowered resistance, increased susceptibility to disease, and oftentimes, physically subnormal children.

It is not Utopian for the industrial physician to include within his purview the matter of infant welfare, prenatal care, etc., as these subjects are inextricably bound to the industrial future of the nation. In one industrial center of the country composed of mixed peoples, it was

found that the infant death rate in the districts of better-housed American workmen was 90.6 per thousand births; in congested, foreign-born districts the rate was 141.2. An increase in infant mortality was noted with a fall in the earnings of the bread-winners. When the chief breadwinner's earnings amounted to \$1,850, the infant death rate was 89.4; when the earnings were between \$1,050 and \$1,850, the rate increased to 127.1; and when the earnings fell below \$1,050, the rate rose to 137.8.

I think it unquestionably proper for the industrial physician to make clear to his fellows the facts concerning therapeutic measures that have a bearing on the public health and are controlled to no little extent by political or legislative action.

VALUE OF VACCINE AND ANTITOXINS

One is moved to a sense of profound sympathy for persons who in this enlightened age adhere to the early inconclusive views surrounding the effects and value of vaccine and antitoxins administered for immunization and curative purposes. With the vast and preponderant evidence of experience to establish definitely levels of value, there is no longer rational ground for opposition. Antitoxins and vaccines are nature's own remedy. When one is attacked by the germ of diphtheria, for example, one begins to develop antitoxin within the blood stream. But there is danger that the diphtheria germ may be developing its toxin faster than the victim is developing antitoxin; hence the necessity of reinforcing nature.

Diphtheria antitoxin is manufactured in a simple manner; a healthy and well-nourished horse is gradually and painlessly immunized with relatively small doses of diphtheria toxins which are progressively increased, producing a high degree of resistance, which means a plentiful supply of antitoxin. A small part of the horse's blood is then withdrawn and refined until only the fluid elements, or serum, remain. This serum is then standardized, placed in appropriate containers, and distributed for use. When required, the serum is injected beneath the skin of the patient, in small doses for prevention and in doses about ten times as large for the cure of the disease. More recently, it has become the practice to inject serum directly into the circulating blood stream by opening a superficial vein. This procedure serves to reinforce nature in her efforts to resist the disease, and, when administered early enough, so fortifies nature that danger is averted and the chance of recovery is tremendously enhanced.

In autocratic Germany before the war, by reason of strict enforcement of the vaccination laws smallpox was almost unknown. In the United States the disease is widely diffused; in some districts it is constantly prevalent, and from time to time a considerable number of cases appear in the larger cities, usually because of official laxity in the enforcement of the vaccination laws. In this country it is not uncommon for individuals and specifically organized groups to defy the law by resisting authorized health officials. The Anti-Vaccination Societies carry on a

fanatical campaign of misrepresentation by citing falsified statistics, half-told experiences of discredited physicians, and unauthenticated cases, and by appealing to emotion, hysteria, and pathetic ignorance.

A discussion of immunization leads one naturally to a consideration of animal experimentation, a fundamental necessity in medical research, and suggests the relation of public opinion to scientific progress. If the anti-vaccinationists and the anti-vivisectionists could have their way, they would legislate against procedures which have saved and will save untold millions of human lives by making possible modern surgery and our present knowledge of such diseases as smallpox, tuberculosis, diphtheria, cerebrospinal meningitis, tetanus, puerperal fever, syphilis, rabies, bubonic plague, cholera, yellow fever and, more recently, diabetes.

The only protection which medical science and social welfare have lies in the public opinion, which legislators clearly recognize, and the strength of which they are constantly alert to sense. If leaders of thought, educational institutions, the press and platform, and other disseminators of sound opinion, together with people who recognize and admit that two and two make four, would secure the facts, trust experts, and take a positive, militant stand based on conviction, the common welfare would be inestimably promoted. There is no serious doubt of the outcome, because, in spite of a noisy minority, informed public opinion is reliable and will ultimately prevail.

STATE AND PHYSICIANS MUST CO-OPERATE

The conspicuous and immediate need of medicine is cooperation between the state with its subdivisions and the physician. How will this be accomplished? If conditions are studied as they exist in Europe, the tendency appears to be toward so-called health legislation. In Germany it was believed that health legislation would lead to earlier recognition of disease and better care of the sick workman and his family. Injuries and disease were to be lessened in incidence and lost time was to be reduced, but the results were wholly disappointing. The scheme did not lead to better care for the sick. They were cared for as badly as before. Doctors who could not make a living in any other way were obtained largely to fill the places created. As there was a certain element of free choice of physicians by the beneficiary, the doctor had, of course, to please the patient to hold his post. The system led to malingering, which the honest physician could not check if he tried, and the result was that he lost his patients to an unscrupulous competitor. This form of dishonesty became so prevalent as to be a public scandal. Time lost from sickness was not reduced, but rather increased. The man with an injured finger, who could have been a part-time producer within a week, did nothing until the finger was entirely well. There was no general co-operation.

In England the same plan was in use with the same result. Patients who were previously treated by physicians without charge were treated as badly at the expense of the taxpayer. It is very evident that health insurance, which may be sound in theory, has omitted serious consideration of that mystifying factor—human nature.

The early organization of our hospitals shows a similar tendency. The model of American hospital organization had its origin in Europe. In the early days a hospital was a place where homeless persons and charity patients could go when sick. This ancient conception of hospitalization failed to anticipate modern requirements. The continuance of this outgrown practice resulted in denying hospital care to the honest, but poor, taxpayer, and we had the extraordinary spectacle of premium on inefficiency and laziness—special hospital privilege for the unproductive person who was a liability rather than an asset to the community. The worthless obtained all the benefits of modern practice which could be obtained by the average man at a cost which he probably was unable to bear.

There is one phase in the relationships of the industrial physician specifically covered by the code of ethics, to which I wish to draw your attention—namely, that which deprives the employer of the right to so-called privileged information regarding the physical condition of the employee. With this I am not in sympathy, for medical service in industry should function for the mutual benefit of the employer and the employee. There are, of course, certain confidences which must be held sacred, but when facts are disclosed that may affect the interest of the public, or the employer, or the fellow workman, they must in all justice be made available to the proper authority in order to safeguard the interests of many against the individual.

The future of the nation rests on the physical, mental and moral health of its units. National supremacy cannot exist without the solid, unwavering support of this triad. Cause, prevention, and result must engage our best thought, with a view to lengthening the life span, maintaining the human power necessary to do the world's work, and preserving mental integrity. The future presents an enchanting vista. A new freedom is available to this nation through medicine—freedom from the infections from acquired diseases, from the charlatan, and from the menace of feeble-mindedness. With open minds, courage, and a growing appreciation of all human values, let us face the days ahead ready to give to our people that service which it is our honorable pleasure to render.

HEAT HAZARDS IN INDUSTRY

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The heat cramps of workmen in the steel industry where my observations have been carried out are all known to you. These workers come to the mill dispensary or are carried in on a stretcher doubled up with cramps, muscular and abdominal, severe enough to require a full dose of morphia for relief of pain.

On close questioning, a great percentage of these cases give a history of excesses in diet, alcohol and daily routine.

In the hot months of the year and especially days of high humidity, dehydration cases are numerous. The regular furnace workers in the pipe mill, where the heat reactions were observed, do not cause us any anxiety with the exception of the socket welding department. Here the

workers are on a piece basis, and naturally work much faster to increase their pay envelope. The eyes are protected by goggles and masks, and eye changes, such as cataract have not been observed.

I have talked to a number of old puddlers who worked at the furnace for many years, and find cataracts only in proportion to the age as one finds it among those who are not workers in heat.

All furnace workers are cooled by so-called man-cooler fans and cold blast air system. The furnace doors are water-cooled and a steam spray from the bottom of the furnace door checks heat flames as much as possible.

I had hoped through laboratory investigation to study these men on the job during the hot weather.

However, our laboratory was not completed until last week. A study of excretions, blood, and basal metabolism should bring forth something interesting. The race and nationality of the worker and his daily habits certainly enter into the question.

In steel and iron manufacture here in the North it has been necessary to introduce the Mexican or Spaniard and negroes,—people who stand excessive heat better than the Northern types, but I have found more heat cases, including exhaustion and cramps, among these men than with other natives, probably due to living conditions and diet.

Figueras, of Guinea, declares that negroes can do the same manual labor as white men exposed to much external heat with one half the amount of food calories.

I have talked to a number of safety men in various plants of glass and iron manufacture, and they do not recognize heat as a hazard.

I offer nothing in the way of treatment for heat cases as the subject relates only to the safety side.

DISCUSSION

Dr. Murat (American Rolling Mills Company): One of the biggest bugaboos that we have in the American Rolling Mills during the summer months, especially on humid days, is with the new men who go into the plant who drink too much cold water, go out into the air and cool off too quickly and have the so-called muscular cramps. When we get those fellows into the hospital we do not give them opium unless we know the secretions are open, the bowels are open and the stomach is empty. We do not believe in giving opium to lock up the secretions. We want to open them up and get the man to sweating freely, and this we do by surrounding him with hot towels around the lumbar region. I have seen very severe cases of cramps relieved in a very few minutes' time by the application of a hot towel over the lumbar region.

RELATION OF INDUSTRIAL SURGEON TO FAMILY PHYSICIAN

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The observations in this paper are the result of six years' intensive work in Boston as a member of the surgical staff of one of the first to offer, and, at present, one of the largest of the insurance companies, dealing with

Workmen's Compensation insurance; and of two years as surgeon to a plant engaged in the production of starting and lighting equipment of automobiles. During this experience there have been abundant opportunities to meet, to confer with, and to get the points of view of a great many general practitioners toward industrial surgery. In general, their attitude has been one of passive acceptance of the industrial surgical situation as it affects them personally, but occasionally there has been outspoken hostility; not necessarily toward the industrial surgeon himself, but toward the system which he represents. This is, of course, an unfortunate and unwholesome condition, for the correction of which this association should stand sponsor.

ANALYSIS OF HISTORY OF WORKMEN'S COMPENSATION

Since the adoption of Workmen's Compensation in Massachusetts in 1912,—and the same must be true wherever such a law has become operative,—there has been going on a very definite change in the relation of the general practitioner to employees who are the victims of industrial accidents, even though those same employees remain deeply loyal to the family physician and call him, as in the past, for ordinary ailments. This changed relationship is due to a variety of causes. No sooner had the compensation law become operative than there appeared in the field numerous insurance companies prepared to provide protection for the employer, and to furnish surgical aid to the injured worker, as well as to take care of his compensation. Prior to the passage of the law, the injured employee had sought aid wherever he chose and entirely upon his own responsibility. The result was that in accidents of any consequence, with lengthy disability, the worker had no funds with which to pay for his treatments and the employer declined the responsibility; while in lesser injuries, the workmen frequently evaded their financial obligations. In the great majority of cases the doctor was the loser.

With the coming of Workmen's Compensation all this was changed. The insurer became responsible for the doctors' bills over a stated legal period,—and "in unusual cases," that is the Massachusetts law,—over whatever period the injured employee required treatment. The great majority of the profession accepted and acted upon this provision in good faith, but a small minority saw in it an opportunity to fatten their exchequers at the expense of the insurance companies, oftentimes rendering bills entirely out of proportion to the nature of the injuries. The immediate result was that the insurers became suspicious of the profession as a whole and soon adopted a policy of questioning practically all medical bills, whether rendered justly or not. This attitude in turn very naturally offended those physicians who were manifestly trying to be fair as well as rebuking those who obviously were not. Another cause of friction, because it was not understood, was the fact that the companies refused, as they must under the law, to assume the bills of cases which investigation had shown to be non-industrial. Because of

the vast number of bills thus questioned, the profession at large received the impression, from which it has by no means recovered, that the insurer's policy is to question every medical bill rendered.

Still another factor entering into the matter of medical fees in Massachusetts is that under the terms of the act the bills are subject to review by the Industrial Accident Board; and the board has fixed a more or less arbitrary scale not commensurate oftentimes with the fees that many of the doctors are accustomed to receive in their private practice and to which they are rightfully entitled. This fact, in itself, has been a source of irritation. It is only fair to say, however, that there are probably a good many practitioners, who, not aware of this fee-fixing by the board, blame the insurance companies for it. As an instance of this practice, the board allows to be made a charge of only \$50 for a single inguinal hernia and \$75 for a double, which fees cover both the operation and after care.

EMPLOYMENT OF PHYSICIANS BEGINS

One of the early and logical results of the situation was for the various companies to employ more and more certain physicians who manifested an interest in the work, who learned by experience what was required, and on whom the companies felt they could depend. These men, or groups of them, were called upon to respond to emergency calls at various plants, to visit when necessary injured employees in their homes, to submit reports as to the nature of the accidents, and to estimate disability.

Unfortunately, in the early days of the act, the type of doctors, as a group, going into this work was quite different from what it is at present. Whereas today the specialty attracts many high grade, well equipped men, just the opposite was true a decade or so ago. The type referred to could be obtained by the insurance companies for a low figure and in many instances had no scruples about their work, often conducting it in a slipshod and unethical manner. The companies soon found, however, that this did not pay and gradually replaced this type of men by one of distinctly superior calibre. But the first type has left its mark which can be eradicated only through the maintenance by the companies of high grade staffs and by the placing of the specialty on a plane thoroughly in keeping with the best traditions of our profession.

The establishment of industrial clinics came as the next and logical step. To conduct these clinics,—we are speaking now only of the insurance, the plant, and not the private clinic,—the companies employ their own staff doctors, who, doing intensive work, and seeing literally hundreds of accident cases every month of all conceivable sorts, become experts, not only in the field of industrial surgery itself, but also in its closely related legal aspect. Thus the large insurance companies have built up their own staffs on whom they naturally depend and upon whom they rightfully look as trained men and as a valuable part of their equipment.

As the act proved its worth and as employers and employees alike came to appreciate the value of proper and prompt surgical aid as an economic factor in cutting down lost time, many factories introduced their own plant hospitals, employing, according to their needs, either part or whole time surgeons, in many instances furnished by the insurance companies. This was but another opportunity for these men to become specialists. At the same time the safety engineering and social service movements were being developed, the doctor playing an important role in each, and thereby, further increasing his value to the plant and to the insurer.

INDUSTRIAL PHYSICIAN HOLDS RESPONSIBLE POSITION

Once the industrial surgeon has obtained the confidence of the insurance company or the manufacturer by whom he is employed, he is in a position where he may be of influence in directing the policy of his company and in winning for it the good will of the profession at large. The insurer and the employer of labor are in business for the primary purpose of making money and are not especially concerned with the ethics of the medical profession. But, since the laws in most of the states are, perforce, bringing the insurer, the employer, the employees and the medical profession together, those concerned should meet on the common ground of friendliness, and, with a desire to be mutually helpful and considerate of the other fellow's rights. The industrial surgeon occupies a peculiarly strategic relationship, being in a position to view both the economic and the professional aspects of the situation, and, in the role of mediator, to soften many of the differences between industry and the profession which may arise. He may, for instance, be asked by the company to pass upon the fairness of medical bills; or by a physician, not familiar with compensation work, just what sort of a bill to present. Let him advise, in the first instance, payment of a fee commensurate with the doctor's standing, and in the second, the rendering of a bill to conform to the industrial standards for the type of services given. It is surprising how much this will do to bring about good feeling. Not frequently the family doctor may send a patient to an industrial clinic for examination, opinion and advice. We have known of such patients not finding their way back to the doctor who has referred them. Such procedure on the part of an industrial clinic is to be condemned. The advice sought should be freely given, transmitted to the doctor, and the patient returned to him for further treatment, provided this arrangement be mutually agreeable.

Many patients, whether under their own doctor's care, or that of the clinic, require treatment longer than the designated legal period. Very often these cases are not recognized by the board as "unusual." In many instances such patients, for personal reasons, prefer to continue with their family physician. Although legally the insurer is not liable for such overtime treatment, he has the option, at least in Massachusetts, of providing for it. The clinic surgeon, under such circumstances, merely

by suggestion to the medical department that the patient be allowed to continue with his doctor and that the company assume the overtime bill, may be able to bring this about, providing, of course, the case is being properly handled. Such courtesy is deeply appreciated both by the patient and the doctor and surely wins good will for the company.

Again, disabled ambulatory patients living a considerable distance from the clinic often find the journey there either actually painful or financially burdensome. In these instances should the employee request that he be allowed to treat with his own doctor consent should readily be given. But better still, let the clinic surgeon sense such a situation and forestall the request by recommending to the medical department that the case be handled as above, assuming, of course, that the attending physician is competent.

TREATING NON-INDUSTRIAL CASES BY COMPANY IS UNFAIR TO FAMILY PHYSICIAN

Very often at industrial clinics one sees both medical and surgical cases obviously not of industrial origin. The insurer is not expected, of course, to treat these patients. Many of them do so, however, in order to keep the good will of their policy holders, some of whom take offense if the insurer declines to give treatment, and also as an accommodation to the employee. This, in our judgment, is wrong to the patient's physician for it deprives him of work which legitimately belongs to him. Whenever one of these cases appears at the clinic the situation should be explained to the employee and he should be advised to consult his regular doctor, and certainly no reasonable employer, the situation having been explained to him, would possibly take offense at this way of treating these patients. Incidentally, these non-industrial cases may act as boomerangs for once treatment has been given, the board is apt to regard this fact as an admission of liability on the part of the insurer and should serious complications arise the insurer may find himself in an unpleasant situation.

Industrial surgeons are not infrequently asked to see an injured employee in consultation with the latter's own physician. The request may come either from the insurer or the doctor, and for a variety of reasons which need not be detailed here. If he will but approach the consultation in the same spirit that he would a private one, the consultant goes far in winning the good will of a physician for his company. Should the case require operation and the attendant be qualified to perform it, why not give him the privilege of doing so, the consultant being present if such be the physician's wish, to share responsibility?

Very rarely the consultant may observe as a result of his wide experience that the physician is not applying adequate or proper treatment. It is a very easy matter gracefully to point out wherein a change might be helpful. Suggestions of this sort, given in the right way, are usually welcomed and seldom cause offense, even though the consultant be present at the company's request, for the physician feels that he is receiving the benefit of trained advice. In making reports on these cases it is a simple matter to incorporate a good work on behalf of the physician.

Such kindly courtesies go a long way in cementing friendship between the physician and the company; and, certainly, unless he feels that the case is actually being mishandled, the consultant should refrain from any adverse comment.

EDUCATIONAL ASPECT OF INDUSTRIAL SURGERY

The industrial surgeon, through the use of the industrial clinic may become a great factor in education. The insurance companies and manufacturing plants maintaining clinics should be encouraged to make them available to the medical schools in their vicinity for teaching purposes. Up to the present time, so far as we know, this has been done in only one or two instances, because of the feeling on the part of the insurers that it would be poor business to do so and would meet with the disapproval of their subscribers. Very likely they are right, but personally we believe that by offering this vast amount of material for instruction purposes, the insurance people would be distinctly the gainers. By opening the clinics, perhaps limiting them to graduates in medicine, or men particularly interested in industrial surgery, the companies would take a great step forward in winning the good will of the profession which would very soon sense this attitude of friendliness and be quick to respond in kind. The reaction could not be otherwise than favorable.

Men taking courses in industrial surgery at these clinics, under competent instruction, would have the opportunity to familiarize themselves with the details of treatment, more or less standardized and efficiently simplified, to become conversant with the legal phases of the work and to acquire the art of handling and keeping satisfied the different sorts of workers one meets at these hospitals. Thus equipped they would be well qualified to take up the work themselves and serve not only industry in their own towns, but very likely the very company at whose clinic they had studied. They would be real assets to their communities and to their employers. Furthermore, students working in the clinics could help in running off the cases, always, of course, under supervision of the men on duty. In return for these privileges, the medical schools might appoint as instructors in industrial surgery certain of the staff men at the clinics. Arrangements of this sort would prove mutually helpful to all concerned and would undoubtedly attract to industrial surgery a great many more first-class men than are drawn to it at present.

There is one other simple expedient by which the profession at large can be made to feel more kindly toward the industrial clinic; that is, by the issuing of a general invitation to the doctors of the community to visit the clinics, giving them the opportunity to observe and to ask questions about the conduct of work. Make them feel that they are as welcome here as they are at any of the large general hospitals. But, especially, let the companies invite those men who, though not regular staff members, are doing for them more or less work in the surrounding towns. And, finally, we recommend that the staffs of these clinics, with

their tremendous opportunities for observation of industrial accidents, give the medical profession in timely articles the benefit of their experience.

Without doubt compensation insurance and its convenient, industrial surgery, have come to stay. They have both proven their worth in this intense period of industrialism and their scope, as times goes on, is likely to become greater rather than less. We are fully aware that many of the foregoing suggestions are diametrically opposed to the policies of most industrial clinics and that they are likely to meet with opposition from the insurance companies. However, we, who are members of this organization and who are engaged in doing industrial surgery, must not forget that we are in the first place physicians and owe a duty to the profession at large which we are in a unique position to render. May we not, then, by using our good offices, both as individuals and as a body, do much to improve the relationship between industry and the profession and to place it on a plane where, instead of the misunderstanding, distrust, and occasional actual antagonism which exists today, there may come a feeling of good will and mutual understanding?

THE RELATION OF INDUSTRIAL MEDICINE TO GENERAL PRACTICE

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Ten or twelve years ago industrial medicine had really no definite status. The medical profession was inclined to look askance at it, and industry itself used it in a very primitive way. Now some of the best men in the profession are attracted to it, and industry generally recognizes it as good manufacturing policy, to the extent that large, well-equipped dispensaries are installed, with medical and nursing attendants in charge.

Every great movement starts with long swings of the pendulum, and it seems that it is inevitable that the pendulum must swing too far. I feel that this has been true with industrial medicine. The work has been carried so far, in fact, that many concerns have had to curtail it most drastically, and some have had to discontinue it entirely. That such action has been necessary, simply attests the fact that the medical service had reached the point where it was no longer good manufacturing procedure. I feel also that in some places the work has been carried to the extent that it is considered by some as a menace to the general medical profession, and this, of course, means failure in the end. In time, industrial medicine will find its true place, and then it will exert its greatest usefulness. Of this I am convinced, that if the industrial physician in any way does otherwise than to help preserve the integrity of the general medical profession, his work will in the end be of questionable value. For in the last analysis, industrial physicians constitute only a small part of that great body which represents medical science—namely, the medical profession.

In the manufacturing business we have certain attachments, certain moorings. In a financial way we look to our banking connections, for metals we connect with certain metal companies, for coal with certain coal companies, and so on through the list. We know that the more we use these connections the better is the relation established between them and us, and that it is better for us to use a certain few all the time than to use many only occasionally. Likewise in the business of living, everyone must have certain definite attachments. He should have established relations with a good grocer, a good clothier, a satisfactory bank, and agreeable place to work, a few personal friends, etc. For the sake of emphasis I have left one of the most important connections for the last—he must also have his doctor.

PRESENT PRACTICE IS SOUND

I have heard many arguments advanced to prove the ineffectiveness of the medical profession, as it operates in this country. We have many enthusiasts who wish to see a general reformation and to have us adopt certain types of governmental medical practice which are in vogue in various European countries. I have tried to follow these discussions from an unbiased viewpoint, but the only thought that I have to offer after long and earnest consideration is that the methods proposed offer no benefits to compare with those of the procedure now established in this country.

We must in all fairness, however, be willing to recognize the frailties of our profession. We must be broad enough to admit that the medical profession is no better than any other group of men. Like all groups it has to contend with dark forces of weakness, selfishness and ignorance, but its weakness is more than compensated for by its strength; its selfishness is far outweighed by its unselfishness, and its wisdom is much greater than its ignorance. Moreover—and this can be set down as an established fact—the general medical profession, with the support of various specialists, is the best instrument by which we can consistently inform the people with regard to medical science, and the industrial physician must recognize this. He must see that all that industry does in a medical way is small in comparison with the work of the medical profession at large, and that he is only an assistant to medical endeavor as worked out by the general profession.

The longer I live and the more I work with people, the more I am convinced that nothing can take the place of the family physician, either in the profession or in the hearts of his patients. A short time ago I was discussing the general status of medicine with one of my over-organized friends. He pictured to me the growing tendency toward group medicine, toward industrial medicine, and toward state medicine, and the final disappearance of the family physician. His arguments told me in a most certain way that he really did not know people, for a basic knowledge of people themselves would have upset all of his arguments. Look over your own life, if you will, and you will see a few friends who stand out apart from all the rest; among these is your family

physician. Indeed, if you take a census of those assembled at this meeting, you will be surprised to find how many took up the study of medicine in order to follow in the footsteps of their family physicians, so great was their personal influence. Can any type of organized effort divorce you from your friends? Can any organization, industrial, state or otherwise induce you to leave your trusty family physician?

I think that we maintain a very good dispensary at the Ohio Brass Company. All of us who are associated with it are proud of the equipment, and we try to give good professional care and considerate service. Yet, with all our facilities, it is very rarely that a patient offers any objection when we suggest calling his family physician; in fact, it is rarely that a patient does not prefer his own physician, in any type of serious accident or illness. It always gives me the keenest joy to see a man's faith in his own physician for I know that he has definitely worked out his attachment in this particular direction, and it is this attachment that will mean most to him throughout his life, more than industrial medicine could ever mean to him. I feel many times that physicians are close to their work and to the profession that they lose sight of the intimate relation that exists between themselves and their patients. I am sure that it is easy to get so close to a thing that one cannot see it. Regain your judgment by trying to remember your notion of your own physician when you were a layman, and those of you who fear the effectiveness of state medicine or any type of organized medicine will find your fears vanishing.

RAISING HEALTH STANDARD IS GOAL OF INDUSTRIAL MEDICINE

Industrial medicine will find its greatest opportunity in helping to raise the standard of health generally. If it sees this real opportunity it can perform a signal service to civilization. The elevation of any of our standards presents some very interesting phases. When labor-saving devices were first introduced, the labor unions said that because one machine was going to do the work of ten men, the laboring man was about to be robbed of his very existence. They had failed miserably in their reasoning. They had not taken into consideration the following facts: namely, that by the use of machinery, the products could be made so much more cheaply, that more people could buy them; that the demand for these products would therefore be so much greater that the amount of labor would be increased; and that by the use of these products the whole standard of living would be raised.

By much the same type of reasoning, when medical inspection was introduced in the schools, certain members of the profession entered a protest contending that it was robbing the doctor of some of his work. All who so argued soon found that the opposite was true, for the examiner aroused interest in health matters and called attention to many physical defects and many chronic diseases which had to be taken care of by the medical profession at large, and medical work instead of being

curtailed was increased. This is exactly what happens in the well-regulated industrial dispensary. In fact, I know that I personally have referred much more work to the doctors of Mansfield than I have kept from them by taking care of certain acute ills at the plant.

But this is only one side of the question. It is also an established fact that anything that adds to a man's productivity benefits the world at large and particularly all those who have any relations with the man. One of the most important functions of the industrial physician is to help create a wholesome and agreeable place in which to work, by exercising such supervision of working conditions that the hazards of industrial disease are eliminated, and by installing proper safety devices to minimize the hazards of accidents. Statistics give us appalling figures for the time lost to workmen each year from sickness and accidents. This time represents not only a loss of real money to every man involved, but also a loss of real money to the world in diminished production. A plant dispensary enables the injured man to receive prompt and proper treatment for all minor accidents and many acute ills, and makes it possible for him in a few minutes to be back again on his job. No one can estimate the amount of time and money that is saved to the worker by these measures which make of him a better man, and which make of both him and his family better patients when they consult their own physician. These are some of the indirect but nevertheless most important benefits that accrue to the general medical profession through the elevation of the general standard of health.

GENERAL PHYSICIAN AND INDUSTRIAL SPECIALIST MUST COOPERATE

The subject of this discussion is "The Relation of Industrial Medicine to General Practice." I have purposely used the word *relation* because it always presupposes a two-sided affair. Whatever blood relation I sustain to you, you of necessity sustain to me. If I am your brother, you are also my brother. A relation can never be a one-sided affair, and if general medicine has a right to expect certain relations with industrial medicine, surely the industrial physician has a right to expect certain things from the general physician. The recognition of this principle is absolutely fundamental in all human relations. And what are some of the things industrial physicians can reasonably expect from the general physician? First, that he practise the fundamental teachings of the best medical thought, and that he use rational therapeutics instead of the irrational prescriptions so often sold by the commercial pharmaceutical houses and so often accepted by many members of the profession.

In his book, "Heart Affections and Their Treatment," Dr. Mackenzie in a most eloquent way gives us this warning:

"If the most enlightened members of our profession were to inquire into the grounds of their beliefs, even those most dearly cherished, how often would they be surprised to find on what fallacies their beliefs are based. Medicine is being evolved out of the ages of tradition, and the bonds of tradition are dif-

difficult to shake off. It is not only the superstitious beliefs of by-gone ages that hamper us, but also the spirit of tradition which is ever present; for the tendency to believe without reason is ever recurring, while reverence for authority makes us accept statements without proof.

"I could illustrate this in almost every field of medicine, but the most notorious example is to be found in our methods of treatment."

I know that every thoughtful physician believes that Dr. MacKenzie's warning is most urgent and I ask you, "Can the general practitioner expect support from the industrial physician if he gives a commercial prescription containing $\frac{1}{2}$ grain of sodium salicylate for tonsillitis, or if a most irritating cough caused the patient to lose whole nights of sleep is treated with a nauseating cough syrup containing $\frac{1}{4}$ grain of diacetyl morphine to the dose; if salves are used on infected fingers; and if infections are going to be scattered or brought to a head, as the case may be, by the use of flaxseed poultices?" These are hypothetical cases but are few of the many therapeutic absurdities which have actually come under my observation recently.

The general practitioner should be most willing to cooperate with the industrial physician when he feels that he must advise his patient to give up a particular job. I was in the general practice for more than five years. I knew what it was to be overworked, with little sleep, and to be profoundly tired, and I fear that more than once when I really did not know what was wrong with the patient, and yet felt that I had to say something, I asked him where he worked, and then without going into the subject to know what he really was doing, or under what conditions he was doing it, I thoughtlessly said, "Well, you must change your job." I am sure that I did not weigh my words. I am sure that I did not know what it meant to that man when I said that he should change his work. I did not realize that it meant severing his business relations which to him probably were the most vital ties in all the world. I am sure that if I had, I would have investigated his work to see for myself just what he was doing. If the plant had had a doctor, I know that I would have discussed the matter fully with him. I feel that this is of so great importance that I am forced to say, "No doctor has a right to give such advice unless he is willing to go to the plant and personally see just what his patient is doing and under just what conditions he is doing it."

It is my firm conviction that this is the kind of relation that must exist between the industrial physician and the general physicians if both are going to exert their greatest usefulness: both must recognize their limitations; both must be willing to recognize the sphere of the other. If they do, and if they are willing to obey the laws which are fundamental to all well-ordered human relations, they will see that they are not at war with each other but are allies in the truest sense.

DISCUSSION

Chairman Elliott: This is not as technical a subject as we have often listened to Dr. Hopkins speak about, but I wish that he would tell us, if he will, how we might help the public and ourselves and the general welfare by getting the public utilities' standpoint. Dr. Hopkins is the chief surgeon of the Chicago & North Western Railroad.

Dr. C. N. Hopkins: We carry, all the time, 70,000 employees, with a large turnover each year, and 500 surgeons who report everything to my office including their bills, which is most important to them. I have had many problems to face, many things to fight. I have become not only a lawyer but a claim agent and a diplomat, and I am a surgeon and executive and a member of the Central Safety Committee.

During the 20 years I have been with the railroad I have come in contact with many problems that have been hard to settle. There is the problem of the local surgeon with the small town man with whom he works or with whom he comes in contact. They seem to lose sight of the fact that they are all working for the general public good, working for the safety and the health of the public. The doctor who is not a local surgeon is so jealous of the surgeon who has been appointed and vice versa that they are busy fighting each other and let the osteopath and the chiropractor and a few others run off with the cream. I have said time and again that I wouldn't practice in a small town if they gave me \$50,000 a year and my rent free. I wouldn't live in such an atmosphere. I have said, "If you men would get down to brass tacks and think more of your patient and less of your own little selfish ideas, if you would get down to the fundamentals of the public welfare, you would be way ahead of the game and would deserve and command the respect of your patients and all labor that comes in contact with you so much more than you do now. You talk too much, you fight too much."

There have been times when some of our surgeons have been called on the carpet by the county society for doing contract practice. We know now, as the doctor says, that we are all recognizing the place and the importance of the industrial surgeon. I don't care how good a general surgeon a man is, there are cases where he falls down and falls down so hard that the industrial surgeon who has had the training and the experience can hold cards and spades against him. Dr. Will Mayo has told me more than once, "You have more of this stuff in a month than we have up here in ten years. What do we know about it? You have the real stuff on the ground as it happens. It comes to us after it is years or months old. We have to work out something where some local man has fallen down or neglected the case." Therefore, the industrial surgeon has created for himself a place, a specialty, that we have got to recognize. He has learned the mechanics of fractures. He has learned the best way to get the man back into service quickest and with the least danger to the man. He has also got to remember that his employer, the corporation for which he works, is looking to him to cut down the days lost, the permanent total disability or the partial total disability, all of which costs money, all of which comes down to an economic standpoint.

THE WELFARE OF THE WORKMAN IS GOAL OF INDUSTRIAL PHYSICIAN

Leaving the economic standpoint alone, there is the welfare of the man himself. How easy it is for a doctor to slam off a leg or an arm without proper consideration. He may force a young man who has a family to support and with a long expectancy to go through life with one leg or one arm where a proper knowledge which has been learned by the industrial surgeon will save that leg by proper methods. I think we all recognize that there is a very important relationship that should exist (I am happy to say, in many instances, does exist) between the family doctor and the industrial surgeon.

What I was going to say in regard to the local man being called upon the carpet by the county society because he is doing contract practice was this, and it has happened more than once: There have been times when the man who has been called upon the carpet has either resigned or had to move away on account of the health of his family or has died, and I have afterwards learned that the man who telegraphed in for the job before the doctor was buried was the man who was instrumental in bringing the fellow on the carpet. It all depends upon where you sit, whether you are on the outside looking in or the inside looking out, and they are all after that annual job, which, of course, they take great pleasure in flaunting to the general public.

I think the industrial surgeon is the most liberal sort of fellow that we have in the profession. He is willing to tell this patient, "You had better go to your own family doctor. You have every confidence in him, he takes care of your family, you listen to him. You don't know me except in a business way. You go to him and I'll do anything I can to help in consulting or making a diagnosis or in the laboratory work." Many times the patient himself will gain confidence right away in that industrial surgeon and say, "Well, doctor, I believe I'd rather stay just where I am. I'm satisfied." But nevertheless he will tell his own family doctor, "I was advised to go to you. Our company doctor said I had better go to you." That, in itself, will instill a feeling of cooperation and friendship which so many times does not exist. I am sorry to see the hair-pulling and the fighting, the scrapping, that goes on with such petty jealousies. I sometimes think that the smallest being on God's green earth can be a small doctor. On the other hand, some of the biggest men, men who would be at the head of affairs no matter what they went into, are doctors also. But we have the two extremes, and we have to deal with the ones in between as well.

I have been most happy to hear those two papers, because they have struck a chord that gets a great rise and thrill out of me; they are both excellent, they have hit the nail on the head, they have touched the point, and I think all of you who are laymen here as well as you who are doctors can see that we industrial surgeons are not selfish, egotistical pups, but at the same time are men of big, broad-minded scope, willing to help and work for humanity and humanity's sake as well as for our corporation, which, necessarily, comes second. In every bad case we have,

our patient comes first; his will power and recovery and getting him back to work come first. Our corporation comes second. We have to tell the truth to the corporation no matter where it hurts, how badly it hurts, whom it hurts or how much it costs.

Chairman Elliott: In calling on the next man whom I have picked to discuss the papers, I am going to call on a layman, a man interested just as you and I are in his fellowmen, who is associated with industrial medicine from a little different angle than you and I are. Mr. Curtis, the vice-president of the New York Federation of Labor is in the room, and I want very much to have him give his view-point as to how we can help labor in some of their problems, and see if he has from these papers this afternoon gotten our slant on some of our problems that we have to face and solve in the industrial medicine field.

Mr. Thomas Curtis: There is one difficulty that I find with the new industrial physician. They forget they are treating the injured man, and a number of them become lawyers instead of doctors; they try to make little of the injury.

We have institutions in the city of New York that are called industrial clinics. Last week we presented three cases before the commission where one man treated the other. They didn't see a doctor at all in the industrial clinic. They put the man in the oven and they didn't know whether they were baking his leg off or on, and they called that "treatment." I believe it is up to you doctors as well as to the public in general to help remedy these conditions, so that industrial clinics will be real clinics where a man will receive proper treatment. In New York, one must be out of work 49 days or more before he gets the first two weeks' compensation. That is where our industrial doctors come in; they see that he gets back, if there is any possible way, or discharge him before the forty-nine days are up so those two weeks are saved. That is the kind of doctor that we have to contend with. The working men of this state are opposed to that system. If we don't find a remedy we are going to use our power to legislate these clinics out of business, because the working men of this state are waking up to the fact that they must receive proper treatment, that they are not to be discharged and thrown on the mercies of the state when they have a condition that doesn't warrant that.

So many doctors become specialists over night. They testify as to the condition of a man when they don't know the first thing about his condition; they see him once and know all about him and all about his family. A man comes in for his compensation and he is confronted with one of those physicians, and he says, "Is this the kind of doctors we have in this state?" He loses confidence right away and he believes every doctor he meets is the same as the doctor who testified against him.

I believe we can make conditions better than they are, that we can have a better understanding with the family physician and with the plant physician, and I agree thoroughly with the doctor when he states that before he sends a man back to his job he ought to find out what

kind of a job he is going back to. It is the easiest thing in the world now to say light work for the man with a fractured leg or a fractured wrist. If the physician states light work he ought to be able to say what kind of light work that should be. That light work question is one of the things that the working men of this state can't understand. What does it mean? It means that under the New York act it gives the insurance company the right to pay the man only \$3500; that is what it means, and that is what the company's physician is trying to do—to get that one phrase, "light work," into the record; then he doesn't care what happens to the man after that. That is the reason you have the great dissatisfaction that you have today.

To the honest, sincere doctor we say we are with you 100 per cent, we want to help develop medicine because I know from my own experience that it is a dangerous thing for a man with an infection to get into the hands of a doctor who doesn't understand the treating of that infection, and the men are trained in some of those industrial clinics to take care of the infection. We want our men to get to that kind of doctor, but we don't want a man to get into the hands of a baking machine and a "violent" ray treater administered by his fellow worker.

DISCUSSION OF PAPERS BY DRS. MEYERS AND GIDDINGS

Dr. Otto P. Geier: I think the last speaker, Mr. Curtis, has thrown a challenge to Dr. Giddings and the casualty surgeon, (and I think that is a better name until he gets over on the other side and acquaints himself with industrial processes).

What I hope these meetings will finally mean in the end is that the layman, the safety man, the man representing the employee, the man representing the management, and the medical profession will come to realize what a terrific economic loss is involved in mismanagement of surgery in connection with industry, what it means to the country at large and the loss of production when a wrong view-point is taken as to how these problems in industry shall be worked out, and that as a result of these conferences we may come year by year closer together, getting such men as Mr. Curtis representing labor and the management here in our groups and using every energy that we have to raise still further the high plane of right thinking in medicine and surgery.

SHOULD THE PHYSICIAN GO OUT INTO THE PLANT?

C. F. N. SHRAM, M.D., CHIEF SURGEON, FAIRBANKS, MORSE & CO., BELOIT, WIS.

An industrial physician must understand men; he must understand the mental processes, the viewpoint of the specific group or groups with which he is working, whether they be miners, clerks, department heads, machinists, executives or a combination of any group of these. He must think their thoughts, and he must speak their language; I do not refer to Italian, Greek, Polish or any other foreign tongue, but I refer to shop talk. He should be able to explain a medical or surgical question in shop language; selecting his illustrations from the employees work and his message will get across.

This does not refer to all physicians, nor do all physicians serving industry have these qualifications. I know plant executives who are real human beings with a sympathetic attitude toward the viewpoints of their employees. I know foremen whom I consider just "bosses." Perhaps you all know of superintendents of departments to whom the man running the lathe or the man working in the stables cannot go with a question and get a sympathetic or even a civil answer. If some of our executives, department superintendents and foremen have not the right viewpoint of the relations which should exist in modern industry, can we reasonably expect all physicians to have it?

I have met a few physicians in industry who are just "bosses"; who speak to applicants for work during the physical examination with abrupt sharp commands and in a sharp tone of voice; who scold the man who got hurt because the injury was possibly due to the latter's carelessness. The employee may need to be censured, but that is not in the province of the medical department, and just after a man has received an injury is not the proper time to "step on" him because of his carelessness.

Perhaps my ideal of an industrial physician and surgeon is high: I want it to be, and I know that I do not measure up to it, but I am sure that those present have the same high ideals in industry that I have, and I am sure that you want your doctor to be a real human being with all the sympathy and kindness of nature that it is possible for him to have.

You deal with your doctor when something is wrong with you or your family and you wish his personal interest. The employees in every mine, in every store, in every shop of each and every industry do the same. They go to the physician with a cut finger, a bruised foot, a burn, a headache, a cold or whatever their trouble or complaint is, and they want what you want when you go to your family physician. They want personal service of the same kind that you expect. They want him to speak the universal language of the sympathetic understanding smile.

PHYSICIAN MUST KNOW PATIENT WELL

In order for any physician to be able to give that sort of service, he must know his patient and know him well. The closer that they can meet as man to man, the better acquainted they are, the nearer to our high ideal will be the meeting of that patient and that doctor.

Let us look for a moment at the opportunities for close acquaintanceship that there are in the average industry employing a physician who is putting on a fairly complete medical and surgical program. First, the man meets the physician as a new employee at the physical examination. (Let us imagine that they both slept well the night before and that the applicant for employment is in good physical condition and therefore confident that he will pass the examination.) Do you, from personal experience, know just how much at a disadvantage a man feels when he is partially or wholly undressed before another who is wholly dressed? Then also, you must remember that they are meeting in the doctor's office. Be the physician as pleasant as he may and as considerate as possible these two men are not meeting on an equal footing, even though it be

an executive of excellent education that is being examined; and very few patients that the industrial physician meets have had the educational advantages that the physician must of necessity have and this actually places the applicant for employment at a further disadvantage. Add to this any uncertainty of passing the examination and obtaining work and we find that these two men are not together at all.

Probably the next time they meet is following an injury or a minor illness to the workman and this meeting is in the shop hospital. Again, they are not on the home grounds of the patient. The treatment of the illness or injury may require that the patient be partially stripped, with possibly the nurse present to assist the doctor; the patient is in his working clothes. He is, quite often, dirty because of the nature of his work and the hospital or first aid room is spotlessly white. The physician's specific knowledge here puts the patient to a greater disadvantage, especially if the former be at all technical in his language.

A dry teno-synovitis, or a traumatic myositis means nothing in the language of the shop. One man in our shop this past year thought that Angina Pectoris was a girl.

If all meetings between these two men—the plant physician and the employee—are at the shop, I wish to submit that these two fellow workmen are not going to establish the contact that your physician establishes when he visits your home to call upon you, your wife or your child.

INDUSTRY WANTS "HUMAN MEN"

It is true that the strictly office practice of a physician and the office practice of the industrial physician are partially comparable. But according to our premise, we want an industrial physician who is going to be a real human being to his patients. Let me add that the reason there is trouble between employer and employee, between management and workmen today, is that we have not had enough of these real human "guys" in industry.

Jones' boss did not know that Jones' wife was sick, and that he was up most of the night before he spoiled the crankshaft, and Smith's boss did not know that Smith's little child had to have an operation and that Smith did not have the faintest idea as to where the money was coming from to pay the hospital and doctor's fees. But when the management does know Bill as Bill, and sees him, not as an employee, but as a man who has three children, who is paying for a home, who goes to this church, or that, and when Bill knows the "old man" in the same way, well enough so that he can ask how the chief's boy is getting along in school, or well enough so that he can laugh at a joke on the "G.M." in the "G.M.'s" presence; then, and then only, will the trouble, imagined or real, fade in industry. I care not what wages are paid, how few hours men work, nor what the ideal conditions are, under which they put in these few hours for high wages, if there is not a real friendly relation between fellow workmen, and by fellow workmen, I mean the "G.M." and the yard sweeper, the lathe hand and the foundry superintendent,

the office man and the miner, if there is not this friendly relation, there is going to be trouble and the better the understanding there is between employees, managements and men, the less trouble there is going to be.

Let me cite the case of the Midvale Steel during the big steel strike. The "old man" knew the boys and the boys knew him, and they knew he was playing fair and he knew they were and so they were true to each other. There was no lockout or strike.

The industrial physician in industry must do more than be pleasant and he must do more than do a technical job well. He must know his patients and if he learns to know his fellow workmen who are his potential or actual patients, and if my reasoning has been good, he will, of necessity, have to meet them on their own grounds, possibly where the doctor is at a disadvantage. I know I have often felt embarrassed when the mechanic was trying to explain something to me about his machine and I knew that he knew that I was a dub and did not know what he was talking about.

The miner is at home in the mine, the mechanic at the bench or machine, the salesman at the counter or office. At his job your fellow workman is dressed for his work, and you, in looking around for some place that is clean enough to stand or sit down or lay down your coat or hat, appear just as much out of place as the workman did when he, in your hospital, was looking for a place dirty enough on which to sit down or lay his hat or coat. The workmen's technical education here effsets yours and he is more suitably dressed than you are. You are both clothed and, therefore, can meet somewhere on an equal footing, and you can get acquainted. You cannot get close enough to a man you do not know to see things as he sees them. In order to get the other fellow's view point, you must now and then, stand where he stands and look through his eyes.

THE INSPIRATION OF COMMON GROUND MEETINGS

. While getting acquainted so that you can treat this man better, this fellow workman, you will at the same time have a chance to see whether he has to work in a cramped position, or whether his work is dusty and many other things about his job. He will tell you about a toilet that is not right, about the wash room and lockers that have not been cleaned out in some time and you begin to realize that in sitting over in the office and doing a strictly dignified practice you have been doing about half the job that is expected of you.

In what condition are the drinking fountains?

What is the source of this?

Have the men who work before the forge fires or in the foundry or in the mines a wash room and lockers so that they are not overly exposed by having to wear cold, sweaty clothes home?

Are there drafts that can be prevented?

Is the lighting system proper?

Papers could be written on what a physician could do out in the shop in preventive medicine, and there is no more laudable calling than that of preventive medicine. Sickness is causing fifteen times as much lost time as that of accidents, and the only place that a physician is going to learn to cope efficiently with disease in a preventive way to get to the place where it possibly originates and where it surely spreads. Yellow fever was not licked by office practicing physicians.

When the men with whom you are working see you out in the shop working so that they may have better conditions, so that they may have clean drinking water from an appetizing place, so that they may have showers, they will have confidence enough in you to come to you with the medical problems of their family and your opportunity for service will be increased many fold.

Do you believe that the National Cash Register Company made that wonderful record last year of a loss of 13 hours per employee by sitting in the office and being dignified?

A man, in order to do a job, must go where that job is. A physician deals with men and their surroundings and he must see them and learn to know them and their habitat in order to know how to treat their ailments and he must know how to so improve their surroundings in order to prevent their having as many ailments.

As has been defined, "the physician in industry is one who applies the principles of modern medicine and surgery to the industrial worker, sick or well, supplementing the remedial agencies of medicine by sound application of hygiene, sanitation, and accident prevention; and who, in addition, has an adequate and co-operative appreciation of the social, economic and administrative problems."

I do not believe that this definition is applicable to a strictly dignified office practice.

DISCUSSION

Mr. John A. Dickinson (Mechanical Engineer, Bureau of Standards, Washington, D. C.): I was in charge of the safety work of a number of large plants during the war and I had the chance of contrasting the work of a number of industrial physicians at that time. I think the most successful industrial physician that I ever saw was a little Virginian who was working with me on one of the large smelting plants in Virginia. That man made a practice of going through the plant at least twice a week. In the chemical industry, of course, the checking up of the health conditions of the men, preventive medicine was vitally important. Dr. Cottrell was a little fellow who weighed perhaps 115 pounds and stood five feet two or three. There wasn't a man who had been in the plant any length of time who didn't love him. He would go around and say to one fellow, "Bill, you're looking a little blue around the lips. Guess we'll ship you out for outside labor a little while." In contrast to that I was in another plant where the physician never did go into the plant; he claimed he didn't have the time nor the technical knowledge. He had no sympathy

for the men; they were cattle, more or less. In some cases it cost us a great deal of money to settle his mistakes. I know of one case where a crushed foot with four broken bones was treated as a sprain, was never X-rayed, and the man was crippled, probably for life.

I believe 90 per cent of our industrial poisoning cases and our industrial diseases can and should be caught by the industrial physician, and the only way for him to do it is to get out in the plant and look the men over before they come to him in such serious condition that they must go to the hospital dispensary for treatment.

INDUSTRIAL SURGERY IN UTAH

Mr. Johnson (U. S. Smelting Co., Salt Lake City): Utah is a small state, and doesn't have very many strictly speaking industrial physicians. The Industrial Commission of the State of Utah prohibits industrial surgery to this extent; that no one except the self-insurer is allowed to contract the medical work. In the ordinary, average industry, the employee chooses his own physician; he goes to any physician he pleases. The Industrial Commission of the state sets the medical fee and the insurance carrier or the employer must pay it.

The Industrial Commission meets with a medical board composed of 30 or 40 or more physicians appointed by the State Medical Society and they pass upon the qualifications of the doctors that render service and upon so-called specialists that have been referred to here this afternoon, and upon the disability of the man. If an employer believes that a man is faking or putting over something, he is referred to the medical examining board and they are final in their discussion as to the disability of the man, whether it is partial, permanent, or whether there is no disability at all. We have found that that works very well, in fact wonderfully well.

Throughout the West we have a compulsory medical contribution from the men, which has been the cause of strikes and other griefs from time immemorial. The medical profession has been referred to generally by the workers throughout the West as "pill doctors." Those conditions are being eliminated by the coming of Industrial Commissions throughout the West, and the men are realizing that they are getting their money's worth. The companies realize that the best is none too good and is the cheapest in the long run. We can hire any number of doctors there in Salt Lake a good deal cheaper than we can hire our present doctor, but we can't hire as good a doctor, and we don't have to pay more money for lost time and bungled up cases.

TREATMENT OF THE INJURY SHOULD BE THE AIM OF DOCTOR

Dr. Hopkins: One of the things that I have to do most on the North-Western Railroad line is to tell the doctor, "Keep your hand out of the claim department, you are not a claim agent, the money doesn't come out of your pocket, it is none of your business! Take care of your patient and give him the benefit of the doubt, even if you do feel he is

running over two or three weeks. Treat him right, spare no money, spare no expense. Don't put him in a ward if you know he ought to be in a room to himself with a private night nurse." I have four patients in St. Luke's Hospital right now with a day and night nurse in private rooms. They are not the president nor the vice-presidents; they are men working on the line digging ditches, working on the right of way. They are just as important to us as far as the human standpoint goes as the president of the road.

Don't get the impression that we are all of the same stripe, that we are all trying to cut down expenses and give you laboring men the worst of it. We are not. Go away with the right idea.

SPEAKERS' FINAL REMARKS

Dr. Giddings: Dr. Hopkins, in the remarks he just closed, has expressed very much what I myself would have liked to say. I believe that the men who are earnestly doing this sort of work and who are honestly doing this sort of work have absolutely the workers' welfare at heart. I think their one object is to get the man well. We want to get him well naturally as soon as we can for his own sake and for the sake of the company who has to pay him compensation. The company which I represent, the insurance company, gives its doctors very particular directions as to how we shall conduct our cases. We are instructed to spare no expense whatsoever in getting those men well and in giving them the very best surgical service which the City of Boston can provide. They retain on their staff a list of the very best specialists in the city. If there is the slightest question or doubt in our minds as to whether a man who comes in with an emery burn of his eye is going to do well, we send him to a competent eye specialist immediately, and if we didn't do that we would be severely censured for it. If that case needs hospital treatment we send him to a private hospital. He is not sent to a public hospital. If he needs a private room, he is put in a private room and kept there just as long as it is necessary to keep him there to get well. That is the spirit of the company by whom I am retained.

Chairman Elliott: Dr. Meyers, will you close your discussion?

Dr. Meyers: I know we will all agree that everybody has an inalienable right to be well and that medical science exists to guarantee that right. I believe every industrial physician, when it comes to a show-down of what is best to do for the patient, is going to turn that patient over to the family physician any time he thinks the family physician can do better for that patient or that he should handle it, because if we believe that medical science exists to guarantee the right that everybody shall be well, then we must try to work out something which will consistently get medical science over to the people, and I profoundly believe that that is up to general medical profession. I believe industrial medicine should be a help to the medical profession at large.

I believe if industrial medicine is a particular art; if we do know something that the general profession doesn't know, we should get that idea over to the medical profession.

Chairman Elliott: Dr. Schram, will you close your discussion?

Dr. Schram: I took up industrial medicine and surgery because I wanted to deal with men who are doing things. I have no neurasthenic cases. Every man who comes into the shop to see me is a real he-individual, and he is working and doing things, and if I can't win him as a friend of mine he is not going to have confidence enough in me to let me be his doctor. The whole thing is summed up in our just being human individuals with each other. They are my fellow employees.

DISCUSSION OF DR. BASSIN'S PAPER

Chairman Elliott: This morning, in order to give them the opportunity to use the room for other purposes and because of the hour and the crowding of our program, we were prevented from opening the discussion of Dr. Bassin's paper on the subject of sprained back. I am sure that those of you who were fortunate enough to hear that paper felt that it was a very masterly effort and that you would perhaps like to discuss it. I will now open this subject for discussion.

Dr. E. C. McCulloch (Mansfield Sheet & Tin Plate Co., Mansfield, Ohio): I am sure that all of us who are practically engaged in industrial work, especially work of the kind where men lift heavy loads, were impressed this morning by the statement that the sacro-iliac sprain didn't exist scientifically. I may have misunderstood the statement, but that is what I believe the speaker said.

I see about one of these cases a week on the average. About two weeks ago a man came into our hospital and said he had hurt his back. I said, "How did you hurt it?"

He said, "I was lifting a heavy piece of steel and I was going to throw it over on the pile this way, and I felt as if I had been shot in the back."

I said, "Where is your pain?"

He put his hand on his back and showed me where the pain was. He didn't know he had a sacro-iliac joint, but he located the right sacro-iliac joint very accurately. We all know that those sprains do occur. Call them a sprain or something else, if you like, but they happen, and they have to be treated, and they always happen in the same way, they always happen when a man bends over and lifts with a twisting motion. One of the sacro-iliac joints becomes the line of stress and there is a twist at the same time, and there is no question about the diagnosis. You can get it if the man is good at describing what he was doing and how he felt. You know what is the matter with him before you have him remove his clothes; you know you have a sacro-iliac sprain to treat.

The orthopedic surgeons don't see very many of those cases—that is, the acute cases. The reason they don't see them is because they are treated by the men in the field, the men in the shop, and ninety-nine out of every hundred at least get well. The orthopedic surgeons see the chronic cases, they see the cases that have persisted in ordinary forms of treatment and that finally come to them, and they often find with careful examinations and x-rays that they have congenital anomalies that

have developed, but it seems to me that must be rare in the practice of the average individual with a large number of referred cases; the percentage would probably be pretty high. I think it would be a mistake if this section went on record as admitting that there is no such thing as a sacro-iliac sprain. I know it is by far the commonest back injury that I have in my plants.

TREATMENT OF SACRO-ILIAC SPRAINS

How do we treat these cases? I imagine we all treat them the same way. The books on orthopedic surgery say the patient ought to be put to bed for two or three weeks. Probably they ought, but the only place to do that would be in the hospital; they won't stay in bed anywhere else. What do we do? We strap them for a few days and have them come back perhaps to renew the strapping. Perhaps we prescribe some massage and liniments, perhaps a belt in obstinate cases. But I believe that the great majority of them go ahead and get well with or without treatment, practically speaking. Diathermy is very useful, I believe, in a limited number of cases.

Chairman Elliott: Not being engaged in a very hazardous or heavy industry, I have seen some rather curious cases of sprained back from trivial injuries, all of them in women, and they invariably consisted of fracture of the transverse processes of one or two vertebrae about the third or fourth lumbar region, with practically no displacement, and I suppose in the old days they would have been overlooked because of the slight degree of trauma—practically no trauma—that had caused them; purely muscular in origin, every one of them. We have had possibly a series of eight or ten in the last few months.

Dr. Bassin: As to the sacro-iliac sprain, an involvement of the region does occur. On several occasions when I attempted to do the Smith-Peterson operation, I found that there was a luxation and I could move one joint anyway, but I found that the cartilages themselves were not involved, but a separation of the cartilaginous and fibrous and bony aspect of the tissue. I don't know just what the results of the operation will be.

Orthopedic surgeons do see these cases, and it happens that industrial surgeons are orthopedic surgeons in many instances, especially those who do bone and joint work.

At the Long Island College Hospital we have a department, so to speak, of industrial orthopedics. Cases which come under bone and joint surgery involving these regions are turned over to the orthopedic division, and we do not see these cases very early. They are not all compensable cases.

Comparing notes, I think you can draw a pretty fair conclusion that there is an involvement.

ADJOURNMENT.

General Session

With the New York State Department of Labor

October 3, 1923

RICHARD J. CULLEN, Chairman

Deputy Industrial Commissioner, New York State Department of Labor

CHAIRMAN CULLEN: In opening this session of the Twelfth Annual Congress of the National Safety Council, I wish to express my appreciation of the honor of presiding over this session, which is really the seventh annual Industrial Safety Congress held under the auspices of the New York State Department of Labor.

THE NEW YORK STATE DEPARTMENT OF LABOR'S PROPOSED INTENSIVE STUDY OF INDUSTRIAL DISEASES AND ACCIDENTS

**LELAND E. COFER, M.D., DIRECTOR, DIVISION OF INDUSTRIAL HYGIENE,
NEW YORK STATE**

I think nearly everyone realizes, that since the Great War our Country is becoming more and more an industrial nation, with all that that statement implies, and in consequence certain changes in our incomes, living, manners, customs and ideals are everywhere evident. Certain it is that those who do not adjust themselves to the new order of things are likely to awaken, to say the very least, to the realization that they are not keeping up with the times.

It seems to be an accepted fact that little or no change has occurred in the general structure of human beings since the human race came into existence. Nor is there evidence that much change has taken place in what might be termed our fundamental human nature. But when the question arises as to the modifications which the race has undergone as the result of changes in environment there is another story to tell. For during the one hundred years just past changes have taken place far greater in extent than in the whole period intervening between the beginning of historic times and the present.

Many and various are the reasons given for these changes—too many by far to recount here, but it seems reasonably certain that one of the principal underlying influences is the gradual replacement of the man power of the old times by the machine power of the new. Which is in

effect saying that the changes are due to the gradual but steady broadening of the scope of industry, and its development in turn into groups of highly organized specialists or sciences, requiring, paying for and obtaining the best talent in the land in order to produce the best commodity for the lowest cost. Somewhat recently during this period of evolution, labor has been organized, labor legislation has been passed, especially with respect to child labor.

Then another set of collateral changes have pervaded industry such as artificial light, chilled air or heated air, dry air or moist air, artificial ventilation, quick transportation, special kinds of clothes for certain workers, newspapers, amusements, etc.; then changes in food such as the introduction of tea, coffee, sugar, alcohol and tobacco. Then during the past fifteen or twenty years the development of industrial hygiene as a recognized branch of sanitary science. It is easy to see how these changes, taken as a whole, have reacted all along and are now reacting upon the mental and physical characteristics of every one, especially those engaged in industrial pursuits. These reactions are even now producing changes day by day, probably changes for the better, but it is only natural that one should ask what and where are the good and bad changes? What diseases are being conquered by the application of the present findings in the field of industrial hygiene, or what diseases are being eliminated by changes in industrial methods? In short, what is the present status of the diseases of industry?

The present relative limitations to intensive study of the disease caused by industry on the part of the New York State Department of Labor are realized, especially when one considers the magnitude of the field, which comprises the whole state of New York with its industrial population of over 1,400,000 people, working in over 61,000 industrial establishments.

On the other hand the Labor Department is at present regularly using the Division of Industrial Hygiene in carrying out certain provisions of the Labor Law. The Division of Industrial Hygiene is a part of the Bureau of Research and Codes, to which it contributes expert assistance on matters relating to mechanical appliances for the removal of health hazards in industry resulting from injurious dusts and fumes, also assistance in lighting, heating, ventilating, hygienic and medical problems. In addition this Division acts in conjunction with the Bureau of Inspection in conducting scientific tests to determine the propriety of orders issued. During the past year the Division of Industrial Hygiene has passed opinions or given expert assistance on over five hundred cases arising in connection with industrial disease or accident hazards in as many factories. I mention this to show that the Division is this minute already at work in the vast field to which I have just referred, and will be able to take proper advantage of the number and variety of its industrial contacts for intensive study just in proportion as it can effectively co-ordinate the small working force which it possesses with the properly directed efforts of the employers and their employees.

WHAT PROGRAM CALLS FOR

Until the present force can be augmented it is thought best to conduct the Division under the following three sections:

First—Section of Expert Inspection.

Second—Section of Special Research.

Third—Section of Accident Prevention.

Fourth—Section of Education.

There should be added to the Division of Industrial Hygiene a person especially trained to have immediate supervision of the section of public education in industrial disease and accident prevention but until this can be provided for, our available talent and resources must be used to their full capacity.

The Section of Expert Inspection will give expert assistance to the Bureau of Research and Codes in matters relating to the character and design of the various devices for removing noxious fumes and dusts from work rooms, and also give assistance relative to accident prevention devices. It will also give assistance on projects concerning the heating, lighting and ventilation of factory buildings. Under this section special medical examination will be made of persons employed in factories or mercantile establishments who are suffering from any disease associated with industry. Also, physical examinations of children between 14 and 16 years of age employed in factories or mercantile establishments as required by Paragraph 145 of the Labor Law.

The Section of Special Research will endeavor to work under the following program:

• Inquiry into the morbidity of diseases caused by industry.

Research in relatively unexplored fields, both with respect to disease and mechanical devices for their prevention.

In order to proceed with the inquiry into the morbidity of industrial diseases in the state, it will be necessary to enlist the interest and help of those members of the medical profession who are associated with industry for this knowledge does not seem to be procurable in any other way. If industrial clinics could be established at large hospitals much definite and valuable information could also be obtained, and it would seem that more could be done than is being done in this direction.

Naturally, this information can only be obtained by degrees from the medical profession at large as the individual physician comes to the realization of the important assistance he can render by looking for and recording the industrial factor when present in certain cases coming under his observation. The reporting of cases will not interfere with the physicians' practice. On the contrary it should develop a new line of research and opportunity.

If this information could be obtained and tabulated it would enable the study of two sets of "standards." One set covering the status of the worker who has been eliminated from industry on account of disease or injury and who can only be found either in his home or in some institution; and the other set, the worker who is somewhat ill, but who continues at his occupation. Extremes in severity and mildness of

disease could be tabulated when found even though they might not be classified as "standards." A study of the standards of industrial disease would include research into the effect of the improvement or of the variations of environment upon the workers, and also the effect of the elimination from certain industries of disease producing chemicals; or in other words the alleged or actual benefit of the teachings of industrial hygiene through the application of the sciences of medicine and mechanics. Now there is an important field.

In this connection it is proper to invite the attention of the physicians in the state to the following paragraph from the Labor Law:

"Par. 206—Every physician attending any person whom he believes to be suffering from poisoning by lead, phosphorus, arsenic, brass, alcohol, mercury or other compounds, or from anthrax, or compressed air illness, contracted as the result of the nature of such persons employment, shall send to the Commissioner a report stating the name and address and place of the employment of such person and the disease from which he is suffering, with such further information as may be required by the Commissioner."

It is confidentially expected that in time the majority of the medical profession in the state will not only report the diseases covered by the above mentioned statute but will further co-operate by sending full particulars as to any other diseases caused by occupation treated by them. It would be of great assistance if the medical journals and the lay press would give this matter enough publicity to remind the physicians of the existence of this law—also of their opportunity to lend valuable aid in this work.

"Research in unexplored fields" can originate from problems arising in connection with the work of expert inspection.

While there is an abundance of most valuable literature available, it has been developed exhaustively along some lines and to a very limited degree in others. Then too some of the literature is out of date in that it deals mainly with conditions in industry which existed before the investigation was made, the findings of which caused the said conditions to be improved. What it is desirable to do is to make a careful intensive examination of the workers in one or more of the hazardous trades and study the effects of certain environments upon the body from a physiological standpoint. For example, to study the blood changes incident to exposure to high temperature and humidity as in the case of laundry workers.

In regard to research into the matter of mechanical devices for the prevention of industrial diseases, the Department of Labor has already contributed much work of a very valuable nature. The result of this can be seen in the New York State Labor Code which is being referred to constantly and adopted more or less as a model. This work should be increased in its scope, and expert assistance should be rendered along

the lines of suggesting after proper experiment devices to remove the health hazards of industry. For example I saw an exhaust device for removing granite dust in operation a few days ago. The designer, the stone cutter himself claimed it removed 60 per cent of the dust. The Industrial Hygiene Division will soon have as a part of its personnel a well qualified mechanical engineer. It will be part of his duty to attempt to improve if not to protect this and other devices of a similar import.

THE SECTION OF ACCIDENT PREVENTION

More and more attention is being paid to industrial accidents, their relative occurrences, their causes, mortality and prevention. A close study of the available statistics will show that accidents occur with remarkable regularity by month and by year. The causes and even the parts of the body affected show a similar uniformity. It is held by some that about 20 per cent of accidents are unavoidable in the sense that no amount of foresight could have prevented them. This would leave say 80 per cent as avoidable or commonly considered as due to "neglect" on the part of someone. When, however, the prevalence of accidents is considered with respect to environment, such factors as fatigue, physical condition, temperature and light come in for great consideration. For example, the relation of temperature to accidents should be studied in this state, also the relation of accidents to output. The relation of new workers to accidents would be an interesting study.

Some of our most active, alert and responsible citizens whom no one would accuse of being careless or of wishing to be injured are the victims of occasionally "not being alert" in this complex age in which we are living. It is extremely difficult to be "on the job" every moment and it is probably impossible without good health and the natural alertness which goes with good health.

The so-called predisposition to accidents might be studied.

It is possible to calculate the number of accidents which are likely to occur among a certain group of workers, if the number which occurred to individual members of the group is known for a period immediately preceding.

A campaign against accidents might include efforts to improve the general health of the workers, thereby producing in them the quality of being able to sustain for as long a time as possible a state of alertness; second, the workers could be made familiar with the dangers connected with their work, and the fact as well that safety devices are only safe when in working order; for example, a boiler may burst if the safety valve is out of order; and third, see that accident prevention devices are generally and consistently installed.

Mr. Bernard L. Shientag, the Industrial Commissioner has planned a very comprehensive educational campaign for the state with respect to safety devices, and there is no doubt that bringing the subject directly to the notice of the people at large by means of models, posters, lantern slides, moving pictures and lectures will be followed by good results.

SECTION OF EDUCATION

If all diseases met with in industry were strictly occupational, they could be eliminated either by mechanical devices or perhaps by regulation, but a large percentage of the diseases are only partly occupational. They are due to a repeated subjection of persons to unfavorable influences of medium intensity and of brief or varying lengths of time. Therefore, this group of diseases can only be handled by education. This group must be taught to work, how to lift heavy objects, how to sit, how to stand, or in other words how to keep one's self in good condition. Education must be given appropriate to occupations—should be put in form for special distribution to the workers in various trades and occupations. It is claimed that education by such methods as posters, lectures, etc., is not followed by success; that the workers are bored by what they term "uplift methods." I do not believe that the old and ordinary methods of education will fail in the case of workers. They are successful with school children; that is when common sense is used in putting forth the information. In every group of persons to whom instruction is being given some will think of other things and fail to listen, some will go to sleep and some will even scoff, but there is always that percentage, perhaps small, who are "on the job" and who not only listen but who absorb, assimilate and tell of what they hear. I believe that the success of education in this respect differs in no way from success in other fields. It is a matter of the right man in the right place. For those who cannot be taught by methods appealing to their intelligence, other methods must be devised.

As stated above, the division should be provided with a person especially qualified to direct an educational campaign against industrial diseases and accidents but in the meanwhile every one of the present staff will be used where practicable for this purpose.

The program above outlined contemplates the development of this Division of Industrial Hygiene into an efficient and worthy organization to fulfill the special needs of the Department of Labor in carrying out the provisions of the Labor Law. It will approach persons and problems as the physician approaches the patient, without bias from outside considerations or influences. When conditions are found to be as nearly as practicable as they should be, the facts will be heralded that others may be able to profit by the good results. When conditions are such that change or improvement is necessary the fact will be pointed out and all possible aid given for proper adjustment. It is not the desire of the Division to inflate itself in size unless the necessity becomes apparent. It is not intended to overlap or parallel the activities of existing State or Municipal Institutions. It will not go out of its natural sphere to do intensive work, nor engage in research simply for the sake of competition or public notice.

It rather aspires to the position of dignity and trust which is held by the general practitioner of medicine who, while not a highly developed specialist in any one sense, is possessed of sufficient ability for the

case at hand together with the acuteness to avail himself of the best all the specialists have to offer, against whom no one is ever jealous or antagonistic and whom every one is glad to have around.

Now that the program has been suggested, can it be carried out? Yes! provided the co-operation of the public health, business, labor and welfare organizations can be obtained, and also that some additional personnel be provided.

HOW INSURANCE COMPANIES CAN ASSIST STATE DEPARTMENTS TO STIMULATE ACCIDENT PREVENTION

MARTIN H. CHRISTOPHERSON, DIRECTOR OF SERVICE, NEW YORK STATE INSURANCE BOARD

This general subject of accident prevention is so colossal and the opportunities for accomplishment so great, that it was difficult for me to refrain from some mention of its possibilities before confining myself to the particular branch of this complex problem on which I intended to speak; that of reducing the number of accidents to the industrial worker.

Industrial Commissioner Shientag of this State, in his talks and through newspaper articles has urged a more complete co-operation on the part of employers and employees for the purpose of reducing accidents and has promised that the State Department of Labor will do its full share to bring about the desired result. At a recent meeting called by the commissioner, to formulate a Governor's Committee on Safety he again urged the insurance carriers and others to energetically work together in the accident prevention movement.

The insurance companies, through their well organized National Council on Compensation Insurance are eminently fitted to take the leadership in accident prevention, not only in this state but also in practically every state in the Union. Among other activities of this Council it is its object to develop systems that will not only measure the hazard of each risk but that also will produce the greatest possible accident prevention effect, although this phase of accident prevention was doubtless intended to be developed in connection with the making of rates for workmen's compensation insurance, the organization has also the making of a wonderful power in the prevention of industrial accidents. On account of its intimate knowledge of this subject, its fully developed organization of experienced officers and office and field force, it would seem that they might now assume the same position in the industrial field comparatively, as the outstanding medical specialist of today, whose main object is to prevent illness rather than cure it. Industry can afford to pay larger fees for accident prevention than they can for workmen's accident compensation.

I am convinced that there is no employer or manager in our country who today does not shudder, when informed that a serious accident has occurred in his plant and that it is the ambition of most industrial leaders

to prevent in every way possible the enormous loss due to accidents. However, they are in need of able leaders in the Safety Movement and I reiterate that the well developed plans of the National Council supported by all the Insurance Companies who handle workmen's compensation risks, is needed and they should take the lead.

In New York State there is paid for workmen's compensation insurance premiums more than twenty-five times the amount it costs to maintain the Department of Labor exclusive of compensation costs, but including all activities in accident prevention, so industry pays in money one way or another. Why not pay more for preventative measures and less in accident and time losses and thus also avoid the sufferings of many workers and their dependents.

ANALYSIS AND REMEDY ASKED

What a wonderful aid it would be to the Department of Labor and to industry, if the National Council would in their systematic way analyze the cause and provide a remedy by education, for industrial accidents often caused by the mental attitude of the worker and those accidents which are caused by unskilled labor in the handling of material; accidents that cannot be prevented by mechanical safe guards but must be accomplished by training the worker to use safe and efficient methods.

It is evident that a worker with ability to concentrate on each duty he has to perform, is in himself the most effective guard for the protection of his own and his fellow worker's safety. Rules prepared by an engineering society can hardly cover this phase of safety.

To prevent accidents by mechanical means so far as such methods are effective, it is well to learn from past experience the number of such accidents, their severity and how they occurred.

The insurance companies and the Departments of Labor co-operating with the American Engineering Standards Committee, by providing for them actuarial data on various accidents, will enable the sectional committees of the American Engineering Standards Committee, comprising representatives from all interests, to prepare codes for suitable mechanical protection against accidents, for all equipment and tools where mechanical guards are effective. Standards thus prepared, when adopted by the departments of labor and by the National Council on Compensation Insurance will result in co-ordinating the differences now existing, between the state codes and the insurance standards, which for many years has been the source of confusion and additional expense to the employer.

The present methods of code making by the committees working in conjunction with the code referees, who prepare code rules for the departments of labor, and the engineering committees of the National Council and the rating boards, who prepare rules for standards used by the inspection division of the National Council, could in part be discontinued and if American Standard codes are adopted, it would promote efficiency, accuracy and standardization.

In one detail of inspection work the departments of labor and the National Council can well co-operate, as it will insure correcting many unsafe factory conditions in a most effective and economical manner and will avoid the visit of department inspectors to places, where safe conditions are maintained and where the past experience performance, is within fixed standards.

The Compensation Inspection Rating Board which is affiliated with the National Council, inspects manufacturing risks where the annual payroll is ten thousand dollars or over, producing insurance premiums of one hundred dollars or over. There are a great number of such manufacturing plants in New York State which are inspected annually by the rating board inspectors, to determine if dangerous moving parts of equipment and machine tools, including their points of operation are guarded, and to determine if the hazardous parts of elevators are properly protected. The inspector also examines the reports made by the plant safety organizations and makes note of the manner in which their work is done. These safety organizations for the prevention of accidents, are charged with making regular and careful examination of the general work shop hazards, such as: conditions of floors, stairs, elevated runways and platforms, travelling cranes, boilers, electrical equipment, explosive liquids, acids and caustics, fire hazards, safety bulletins, etc. The plant inspector is required to make weekly inspections and the safety committee must make monthly inspections, a written report of the results of such inspections and the Committee Meetings must be kept on file.

The rating board inspector's report is tabulated and computations are made in the offices of the board to determine if the physical conditions of the plant and the employees or plant safety organization work, is above or below the average in established standards. From this computation there is then established for the policy year, the adjusted rates for each classification of the manual rates, downward in proportion as conditions approach the established standards or the rates are increased proportionately as the conditions fall below the average conditions.

An actuarial analysis of past accident experience is also used to complete the allowable credits or charges against the premium, as past experience also reflects the results of safety organization work, through the number and severity of accidents over a long period, so the protection against accidents by guarding hazardous conditions and the results of educational work of plant safety organizations, are the means of materially reducing the premium for coverage. The results of each adjustment are printed on a 3 x 5 card which, in turn, is sent to all the insurance carriers.

I believe it goes without saying that the work of the rating board and its inspectors must be maintained to a high degree of accuracy, otherwise the assured and the insurance carrier who respectively pay and collect premiums on the basis of the rating board's determination would register strenuous complaints.

SUMMARY

The proposition which I have been leading up to summarizes something like this:

First—That the rating board through their so-called "blue card" the 3 x 5 card I have previously mentioned, gives to all the insurance companies soon after an inspection is made, a summary in figures of the assured's good or bad safety conditions and I think you will agree with me that the use of such information by the departments of labor to analyze and determine on the need for such plant being inspected by the labor department inspectors would be of inestimable value, as it would introduce a scientific and practical method for determining on the need for such inspection. For instance if the credits indicate safe conditions, the department would not make an inspection, on the other hand when charges indicated an unsafe condition, an inspection by the Department can be expedited in proportion to the extent of the hazardous conditions indicated by the charges.

The following year the department would receive another blue card, showing the conditions at that time and a comparison with the previous year's card would again indicate if the plant required an inspection by the department.

If the insurance carrier was furnished a copy of the orders issued to its client, it would enable the carrier to give service to the assured by recommending safeguard standards, that would not only reduce accidents but for which the employer would thereafter also receive credits on his premium.

Second—The manufacturer who has maintained safe conditions in his plant will, under this plan, have his plant inspected only by a rating board inspector and the labor department inspector will visit only the plants of those concerns who are lax in their safety regulations.

Third—The department of labor under this plan will be benefited by having their attention directed to those places where there is the greatest need for their supervision. It will also assist the department in efficiently carrying on their work and enable their limited organizations being used to best advantage.

Fourth—The engineering societies who are interested in securing standards practices will in this plan expedite the adoption of their standard requirements, as this co-ordination of work between the insurance interest and the labor department will require uniformity in providing for safe methods and in guarding moving parts of machinery.

Fifth—The proposed method is sound and if adopted in general as planned, with modifications to suit the varying conditions in different states it will doubtless result in elimination of many existing unsafe conditions in the most prompt and economical manner and in the maintenance of improved conditions for the industrial worker.

In New York State during the past year there has been quite a sharp upward trend in the number of accidents reported and in compensations claims filed, although there are no records that indicate if accidents are

more or less per hundred employed so it cannot be determined if the increase in accidents is due to a greater number of persons employed or to an increased percentage.

Although much time, effort and expense, has been put into safeguards for industrial workers for some years past, the compensation payments in the state will be well over fifteen millions for the year.

The much desired drop in the number and severity in industrial accidents has not been reached, except in individual industries or plants where the entire organization is being constantly trained to think and practice safety and where this feature is analyzed and systematized in the same careful manner, as the manufacturing processes of the goods which they sell.

Well directed co-operative work has solved many problems and let us work together so great progress on this problem will also be made, so I leave this thought with you for your consideration feeling assured that in some way the various organizations and employers will find a way to accomplish the best results and may our meeting next year reflect the effects of co-operative work.

DISCUSSION

Mr. C. H. Thompson (Eastman Kodak Company): Mr. Chairman, I simply want to indorse Mr. Christopherson's plan for concentrating the inspections of the labor department on those industries where no safety conditions are shown to exist. I think it will conserve the work of the inspectors of labor department, and it will tend to simplify some of the codes.

In connection with the subject I would like to bring in just one factor that we have taken up in Rochester. That is the inter-plant visits that have been established by the Rochester Safety Council. A safety man from one plant goes through another plant and the inspectors exchange ideas that are being carried out, and I think that plan, if continued, will work for better results.

I would suggest that the reports of the factory safety engineer be submitted to his manager and copies also be submitted to the department of labor. They could then check them up and if they saw the safety engineer was going wrong they could correct him. In that way they could help us out lots of times by pointing out our errors.

Mr. Christopherson: I think there might be two great bugs in our bonnets: one to avoid accidents, that is by employees, who must be taught to avoid accidents to himself; the other to the employer of the safety organization and those who are elected to prevent accidents. There are many accidents that occur that cannot be charged to the lack of mechanical safeguards. There is a great deal to be done, as you all know, in the educational way, and it is with that thought that I brought this out in an effort to reduce accidents, provide statistics, and if need be take in any other plan that might be efficiently worked out for accident prevention.

Mr. J. L. Gernon (Director of Inspection Bureau, Labor Department): In the state of New York it has been utterly impossible to bring together standards used by the insurance carriers and the code rules for

the reason that it creates this situation: that any employer in the state failing to comply with such a rule can be prosecuted and that rule must be such that it is practicable and can be complied with. That is not true with all standards of the insurance carriers. All of those standards cannot be carried out. For instance, the insurance carriers require the elevator gate to come to the floor. Now, there are many conditions where it is impossible to do that, and if that became a code rule in the insurance carrier's standards that man would never be indicted in the courts if he could prove that it was impossible to carry out that rule.

Mr. Gabriel: With reference to the point brought up by Mr. Gernon, Mr. Christopherson's paper will show us just exactly how that point is taken care of. Mr. Christopherson brought out the point that the figures on the inspection report show a certain risk, and an analysis will be made of them and whatever is shown by these figures will be taken as a basis to determine whether it is necessary to make inspections or not.

STATE AND INSURANCE COMPANY INSPECTION STANDARDS

Mr. J. L. Thompson (Travelers Insurance Company): I never could see any reason for any disagreement between the standards of the insurance company inspectors and the state inspectors. If you allow that the state standards are made the same as the insurance standards, and the state inspectors go in with the same understanding of this interpretation that the machines are not guarded, and see to it that they are guarded in accordance with the standards, why do they need an insurance rating? As I understand it the state inspectors can go into these plants and are equally as competent to tell when a machine is unguarded as the insurance inspectors. Their job is to see that it is guarded; it is for them to work together, allowing that all men are equal as regards an accident, and to work out standards; get the job done; get the guards put on. The insurance company has not the authority (except the authority of cancellation) to enforce placing of guards. We do the best we can to persuade a man to take these precautions.

Mr. Christopherson: There is no question but what the state departments have the authority, police power and everything that is necessary to enforce their orders and that the insurance companies have no such authority. Their inspectors go there and conditions are recorded and through a matter of credits and charges they endeavor to bring their client's conditions to a better standard, but the fact is that there are entirely too many accidents after the number of years that we have all been trying to eliminate them. We need to go a step further. We need the way through their inspections, the blue card indicating a summary of inspectors, and the department of labor, the rating board inspectors paving the way through their inspections, the blue card indicating a summary of the conditions of that plant, and the department of labor, if it finds the conditions poor through that summary, immediately gets busy. That is where we need them. If the conditions as shown by that card are good, why inspect that place to death? The insurance companies have more

data than it is possible for the department of labor to get from the manufacturers. They do not need to give this data to the department of labor except in a percentage way, showing how accidents occur. They need not give the name of the client; that goes to the rating board and is just a matter of so many figures, so many accidents of a certain case, happening in a certain way where a certain number of people were exposed.

Mr. Gernon: In 1913 it was tried to bring about one standard, but that was not very favorably received by the insurance companies. In some instances the department of labor standards are not as high as the insurance companies. The insurance companies realize that the standards should be higher than the law for the matter of safety.

EMPLOYER ENTITLED TO PROMPT INFORMATION

Mr. H. A. Rowlands (T. H. Symington Co., Rochester, N. Y.): I would like to endorse Mr. Christopherson's paper most thoroughly. I would also like to endorse Mr. Thompson's remarks. I am able to testify about the inspections by men of other plants. During the present year we were visited by a committee representing different plants in Rochester who came to inspect my plant. We have monthly inspections by the workmen. The following month the recommendations we have made are carried out. In the last four years the regulations that have been made number about ten thousand, and at the present time over sixty-two hundred of them are not complied with. Now I believe this plan of ours will conserve the time of the safety engineer in the plant. It is a good day's work for a safety engineer to go through an ordinary plant and inspect it. It also saves a day's time to the commissioner and you know he is a busy man.

Mr. John Lundrigan (International Paper Company): I notice that everybody has been pretty well taken care of and sympathized with but the employer. I would like to inquire of Mr. Christopherson whether he would object to send it to the employer as well as the insurance carrier?

Mr. Christopherson: The employer does get a report of the rating board's inspections. He gets the details of that report. For each report made by the rating board for inspectors there are compiled cards indicating in a percentage way to the insurance carriers, a condition which reflects the report that is sent to the owners of the plant, and the Labor Department of course, issues an order for correcting those conditions, and that order goes directly to the owner of the plant; so the owner of the plant primarily gets all this information. The owner is not let out of it at all.

Mr. Lundrigan: I do not believe the employer gets the information he should have in a reasonable length of time after it is known to the inspector. The state labor department issues a great number of orders against our plant. In the present year we got perhaps four hundred per cent, or perhaps one thousand per cent would be better, of the questions from the resume made by the state inspectors. Our safety organization reported and corrected probably two thousand per cent more separate

items than the state or rating board presented. Therefore we believe that the employer is entitled to most prompt and correct information.

The states should show some initiative in this matter of statistical information.

THE TREATMENT OF INDUSTRIAL INJURIES

RAPHAEL LEWY, M.D., CHIEF MEDICAL EXAMINER, BUREAU OF WORKMEN'S COMPENSATION, NEW YORK STATE DEPARTMENT OF LABOR

Does the title of this paper imply that there is any special surgical treatment in industrial surgery which differs from the daily surgical treatment for the usual pathological condition? I shall answer this and not refer to this question again by saying that in addition to the ordinary surgical treatment, from which the treatment in industrial surgery does not differ, there is an additional important and predominating treatment—namely, the rehabilitation of the injured by restoring the defective function to as near the normal as is possible. This latter part of the treatment was not in vogue until this law of Workmen's Compensation was created. To give an example of those days I request the older surgeons assembled here today, to recall the treatment of fractures of the lower extremity which consisted in immobilization of the fractured limb, the changing of casts at certain intervals, and the discharge of the patient from the institution after union of the fractured fragments had taken place. The patient was told to return to the outdoor department or dispensary, and there he received the well known A B C linaments until after having been discouraged in one clinic, he would wander from one to another, until the patient was lost sight of and remained a cripple. There is a very important difference in our treatment at this date and especially so of fractures, to which I will refer later.

In discussing the treatment of industrial surgery we must have a conception of the accident injuries, and, therefore, be able by our training to institute the adequate treatment. I shall refer to the treatment of injuries of the skull and spinal column, those of the back, those which cause infections, with special reference to those of the upper extremities, and fractures of the long bones near their epiphysis.

The symptomatic treatment of industrial injuries is subdivided into:

- (1) The immediate, and urgent treatment where the individual's life is jeopardized.
- (2) The indicative surgical, technical procedure.
- (3) The post-operative or recuperative treatment.
- (4) The rehabilitation or refunctioning treatment which consists in various therapeutic measures from the original application of heat and cold to the application of various mechanical apparatus.

INJURIES TO SKULL

I shall first refer to the injuries of the skull and I will call your attention to the fact that the special posture of the workman predisposes to special injuries. That class of workmen who labor above the ground and

who represent the various structural building trades are predisposed to the most severe injuries, such as falls from great heights or, in consequence of handling very heavy objects, crushing or mutilation by virtue of impact with those objects. The treatment in such cases demands thorough equipment under the guidance of a very competent surgeon who is thoroughly familiar with the very first indication of jeopardy of life, and who knows how to administer any necessary aid. The immediate or waiting period for surgical interference in injuries to the skull with or without compression and with or without indicative focal lesions requires the attention of a very thorough, mature physician; therefore, the injured workman, especially in injuries involving the skull and upper part of the spinal column, is best taken care of by immediate removal to a well-equipped hospital. Considering that such cases require operative interference in consequence of symptoms and indicative signs of compression, we must consider that the after-treatment in these cases is of very long duration. By after-treatment I do not mean the post-surgical treatment, for such, if not complicated by any infection, is equivalent to the ordinary surgical interference for trephining. By long duration of after-treatment I mean the adequate rehabilitation treatment for the so-called post-traumatic neurological sequelae which need not necessarily be an organic nerve lesion, but can often be of sufficient functional neurological disturbance, to require treatment of long duration; and which in my large experience is very unsatisfactory as to the ultimate result. Among these cases we find the various neuroses which cause a permanent partial or permanent total disability.

It is impossible to speak on every phase of post-traumatic complications following injuries to the head and to the intra-cranial contents; but I simply wish to call your attention, and such is borne out by the observation of a very large material, that it is astonishing how often we have the most serious post-traumatic neurological sequelae after apparently slight injuries to the skull, and vice versa.

Among these classes of cases I also wish to refer you to the various psychoses, some based upon distinct previous acquired infections which have remained dormant, but were activated by the injury and require special attention. I know of no more serious and continuous post-traumatic complications after head injury than the so-called headache and vertigo, which most often cannot be confirmed by any physical examination, as there is no organic nerve lesion, and which is so little amenable to the most up-to-date treatment. It is suggested that neurologists possibly specialize in the careful study of post-traumatic headache and vertigo, and be some day able to differentiate those of actual existence and those which may possibly be attributed to simulation, as there is no exact demonstrable proof for diagnosis, and also be able to have a better treatment for these enumerated conditions than we have up to the present date. In conclusion, concerning head injuries I wish

to state that no injury to the head, however slight, however extensive the manifestations may be, should be permitted to be treated without a thorough, repeated stereoscopic X-ray examination.

INJURIES TO BACK

In speaking of injuries to the back, we are compelled to separate those which are a sequence of heavy objects falling upon the individual's back, from those where, during certain posture of the individual while in the act of stooping or lifting, an undue physical exertion may cause an involvement of the soft tissues covering the spinal column and either side of it. I might call your attention to the fact that workmen exposed to these injuries most often work beneath the ground and in their vocation stand in a semi-flexed posture thus exposing the surface of their back to the impact of force and falling objects from above. The severe injuries to the back which result in fractures of the spinal column with or without involvement of the cord or its coverings are serious injuries and require immediate adequate hospital treatment. Every injury to the spinal column requires an immediate and often repeated X-ray examination in various positions. To show how important a thorough X-ray examination of the spinal column is for diagnosis, I will call your attention to the fact that there is one fracture of the spinal column which no clinician can diagnose or suspect without a thorough X-ray examination; namely, a fracture of the transverse process of the vertebrae. There is not one distinct subjective or objective symptom which is specifically indicative of such a lesion. The condition clinically resembles an ordinary contusion of the spinal column.

As I have to limit myself only to the description of the treatment, I shall first take up the treatment of contusions of the spinal column and its overlying tissue. All injuries to the spinal column with or without external manifestations with a predominating symptom of pain on mobility of the spinal column, whether such is forward, backward, rotary or lateral, or whether such is increased while the individual is in a recumbent or sitting posture, and also is complaining of pain during the manipulation of the lower extremity, requires, at first, absolute rest in a recumbent posture. This very acute painful condition requires early immobilization by the various orthopedic appliances. Those painful conditions which, in addition to the subjective symptoms, show X-ray findings indicative of an osteo-arthritis or inter-vertebral spur formation, require immobilization and sometimes, even surgical interference to really immobilize that part of the spinal column. There are other injuries to the soft tissues of the spinal column classified under contusions and strains which do not elicit one corroborative sign to confirm the subjective pain of which claimant complains. It is very difficult to state whether such lesions actually exist, and to prove such being the case, I need only refer to our extensive material which has been examined by a number of clinicians, who markedly differ from each other in their opinion. These cases require a disability of long duration, and do not seem to return to work until the case is disposed of by some pecuniary settlement. Any number

of cases where there is no external manifestation of an injury, and where the pain is localized and increased on deep pressure, and increased on mobility of the spinal column, although some of them, and I may say a good many among the claimants above 45 years of age, are predisposed by constitutional conditions, such as the various rheumatic affections, are amenable to the treatment of massage and baking, if properly applied, but such treatment and such disability are also of long duration. Injuries of the spinal column, such as fractures of the parts of the vertebrae with compression which causes immediate focal signs of pressure require immediate surgical treatment, namely, laminectomies, removal of the compressed fractured fragments and, if such are accompanied by a cord lesion due to pressure upon the cord which has lasted for any length of time, the consequent defects are to some extent permanent. Where, however, a cord lesion is due to hemorrhage, either extra-dural or in the subdural space, although the early clinical picture resembles that of a compression fracture, the prognosis as to ultimate recovery is better if the hemorrhage absorbs, and the objective signs which were indicative of a focal paralysis disappear in time. I have observed cases of either type and my opinion is based upon the observation of a large material. In all cases of spinal column injuries, if such involves workmen more than 50 years of age, the period of disability is of very long duration, and all the treatments at our disposal are not very effective.

TREATMENT OF INFECTIONS

I shall now take up the treatment of infections with special reference to those involving the upper extremities. The smaller the wound, the more serious the infection. A wound punctured by some pointed implement causes the most serious infection. However trivial a wound may be, it should be surgically treated immediately, either by the immediate application of tincture of iodine or by the application of some other antiseptic dressing. It is this very early treatment that sometimes prevents the formation, or consequent spread of an infection, for during the first 24 to 48 hours, there may be no local reaction indicative that an infection exists or may develop. To speak of the indicative treatment of every possible infection is not the scope of this paper. I wish, however, to make a statement here which will possibly meet with some antagonism, but I have no intention of changing it, as it is based upon an extensive and mature hospital and clinical experience, and the observation of a very large material and its post-operative results in our state service. Early incisions where there is no detectable pus focus, although having been advised by a number of surgeons, give ultimate results, as to the future anatomical and functional defects, which are very bad. Where, however, the acute infection is of the infiltration type with or without any accompanying lymphangitis or cellulitis, and where there is no detectable focus of pus, I have in a large material during the last 15 years applied the application of heat or the adequate Bier's hyperaemic treatment, and have been able to convert these infiltrations into pus foci; then, immediate adequate incision and drainage have resulted in

less tissue destruction and better functional rehabilitation of the parts, than in those cases where early free incisions have been used. The infections in consequence of punctured or small lacerated wounds involving the flexor surface of the index, second and third fingers, are not as serious as the infections which involve the flexor surface of the thumb and little fingers. The cause for this differential severity in the infection lies in the distribution of the tendon sheath of those tendons in their relationship to the bursa at the flexor surface of the annular ligament. In spite of all the so-called adequate treatment at our disposal as rendered by our competent surgeons, and rendered immediately after the injury, these infections cause, in my large material, the most destructive permanent anatomical and irreparable functional defects and I believe, as stated before, that these defects are due to the very early incisions where there is no detectable pus focus, and which disseminate the infections along the tendon sheaths. In all infections, however, where surgical treatment has been rendered, it is advisable as soon as the acute infection is over, the discharge of the infected area is lessened, and the acute painful symptoms have disappeared, to start adequate careful, not brutal, passive manipulation. The prolonged immobilization of infected extremities have predisposed to permanent irreparable functional defects.

The question now arises whether the defective functional deformity of the upper extremities following the infection can be remedied by tendoplastic work. During observation of my extensive material during 10 years, I have seen after plastic surgery in some cases good cosmetic defects, but functionally as to their vocations, absolutely useless rehabilitation. Where the infection does not involve the interphalangeal joints, but has localized itself to the soft tissues, tendon sheaths, and tendons, and where, after careful examination, the mobility of the joint is found intact, but where the functional immobility is due to indurated adherent scars to the underlying tissue, undermining of the scar or excision of these scars is indicated, and has resulted in a number of cases in fairly good rehabilitated function.

ADJOURNMENT.

A. B. C Session

October 3, 1923

C. B. AUDEL, Chairman

Manager, Employees' Service Department, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

CHAIRMAN AUDEL: I take pleasure in introducing, or rather in announcing Dr. Risteen, of the Travelers' Insurance Co., perhaps even better known as the editor of that most excellent paper, "The Travelers' Standard."

THE ESSENTIALS OF SAFEGUARDING

A. D. RISTEEN, PH. D., DIRECTOR OF TECHNICAL RESEARCH,
THE TRAVELERS INSURANCE COMPANY

A given safeguard may be essential from anyone of several points of view. In the first place, there may be some definite law which requires that it be used. In any case of this kind the specified safeguard is "essential" in the most absolute sense, and the only thing to do is to install it without question.

Secondly, there may be some local practice or decision which has not precisely the force of law, but which nevertheless should be respected and followed. Anything of this kind should be regarded as essential, because we should not limit our interpretation of that word to regulations the violation of which would actually land us in jail, or oblige us to pay a fine.

There are also various codes put forth by recognized authorities along different lines, and these codes, while they may not (and usually do not) have the authority of law, are nevertheless entitled to respectful attention, because they presumably reflect the opinions of men who have studied the question carefully, and who have determined the principal dangers of the industry or other activity to which the codes relate. Conformity with such codes, at least in all important respects, should therefore be regarded as almost essential, if not quite so.

Then again, the insurance question is well worthy of consideration. The insurance premium may depend to a large extent upon the physical and moral conditions that prevail in the insured plant, and if the owner of the plant wishes to obtain the lowest insurance rate for a given coverage, he must conform with certain requirements which are explained to

less tissue destruction and better functional rehabilitation of the parts, than in those cases where early free incisions have been used. The infections in consequence of punctured or small lacerated wounds involving the flexor surface of the index, second and third fingers, are not as serious as the infections which involve the flexor surface of the thumb and little fingers. The cause for this differential severity in the infection lies in the distribution of the tendon sheath of those tendons in their relationship to the bursa at the flexor surface of the annular ligament. In spite of all the so-called adequate treatment at our disposal as rendered by our competent surgeons, and rendered immediately after the injury, these infections cause, in my large material, the most destructive permanent anatomical and irreparable functional defects and I believe, as stated before, that these defects are due to the very early incisions where there is no detectable pus focus, and which disseminate the infections along the tendon sheaths. In all infections, however, where surgical treatment has been rendered, it is advisable as soon as the acute infection is over, the discharge of the infected area is lessened, and the acute painful symptoms have disappeared, to start adequate careful, not brutal, passive manipulation. The prolonged immobilization of infected extremities have predisposed to permanent irreparable functional defects.

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Then again, the insurance question is well worthy of consideration. The insurance premium may depend to a large extent upon the physical and moral conditions that prevail in the insured plant, and if the owner of the plant wishes to obtain the lowest insurance rate for a given coverage, he must conform with certain requirements which are explained to

him by the insurance company, either through its inspectors or otherwise. In a general way it is possible to make a simple statement with regard to this aspect of the safeguard problem. The premium rate is affected to a certain extent by quite a considerable number of items, but the principal things to attend to in order to obtain a reduction in rate, are three in number.

SAFETY MEASURES DEMANDED BY INSURANCE COMPANIES

First, there must be an approved and effective safety organization within the plant. The plan in accordance with which this organization is established will naturally vary according to the size and nature of the plant, and of course I cannot go into this question, because it is too far removed from my immediate subject. But I want to point out that it is idle to have a safety organization unless the recommendations that it makes are adopted and followed. Quite a number of these recommendations will relate, naturally, to the establishing of special safeguards at points where the safety inspector or committee recognizes the existence of special dangers; and therefore, I should count the recommendations that the safety committee makes, among the essentials that are to be respected and followed.

Secondly, so far as general insurance requirements are concerned, reduction of rate depends largely upon safeguarding the point of operation of each machine. It is not easy to give a satisfactory definition of the expression "point of operation," but in most cases its meaning is sufficiently clear. According to the Industrial Compensation Rating Schedule of 1923, as issued by the National Council on Compensation Insurance, the "point of operation" of a machine is "that part of the machine where stock is actually inserted and maintained during any process of forming, shaping, or other necessary operation." All power-driven machines are considered to have a point of operation, and also certain hand-power and foot-power machines, which are specifically listed in the schedule from which this definition is taken. It is impossible to discuss here, the particular forms of guards that should be applied to protect the workmen at the point of operation, because they are exceedingly varied in nature, according to the type of machine on which they are to be used; but the company with which I am associated publishes an illustrated booklet called "Industrial Standards," which covers the more important points in a general way, and copies of it may be had without charge by those who are interested to go into the subject more fully.

Finally, the insurance rate depends to a significant extent upon the safeguarding of the mechanism by which power is transmitted to the machines in a plant. This covers the safeguarding of shafting and belting, especially near the machines, and it also covers the proper protection of set-screws, and other projections that might catch in the clothing.

PANIC AS AN EVER-PRESENT HAZARD

It is surely fair and proper to consider, as essentials, such precautions as may suggest themselves for the protection of the entire mass of workers in a plant, against hazards of a universal and ever-present type, and especially against those that may produce fire catastrophes. For example, there is always a greater or lesser danger of fire, and of panic following an alarm of fire or accident from some other cause. So I should say, that the first thing to provide, in the way of safety, is an effective means of escape from the building, in conformity with this idea, the safety man should see that there are adequate fire-escapes, and that they are installed intelligently and safely so that it will be possible for a fear-crazed crowd to use them effectively and without too much congestion. He should also see that the stairways are properly lighted, and that they are provided with suitable railings.

But just by way of illustrating how hard it is to say what the essentials really are, I would call your attention to the fact that the mere provision of exits of a rational nature and of adequate size does not assure that things will work out in an ideal way in the event of a fire. Many illustrations could be given of employees becoming panicked with fear, so that terrible consequences followed when they all tried to crowd into the stairways or out upon the fire-escapes at once. It is not the thing itself that is needed, so much as a combination of the thing, and of training in using the thing. And so I say that although the physical means of escape are to be counted prominently among our essentials, they may not be of much benefit unless the employees are organized and trained with due regard to the possibility of fire, nor unless intelligent fire-drills are held from time to time,—often enough to insure that every person present will know just what to do when the emergency arises, and will be sane enough and clear-headed enough to actually do it.

I spoke, a moment ago, of the lighting of stairways. Of course, that is not the only place where attention should be paid to proper illumination, from the accident-prevention standpoint. Many of the accidents of industry, that are usually assigned to totally different causes, are probably due, at the bottom, to improper illumination. Hence you should give special attention to this matter, and should see not only that there is enough light, but also that the lighting units are properly placed and properly provided with shades and reflectors, wherever these things may be needed.

Prominent among the essentials of safeguarding I should include the provision of suitable railings and toe-boards along the margins of elevated platforms from which men might fall, or from which tools or other small objects might be knocked off upon the heads of those below. I would advise you to look over your plants carefully, and see where you can put in some more of these things to advantage. You will probably find several places that are really in need of them, the first time you look.

Holstway openings in floors are exceedingly common, and they are prolific causes of serious and often fatal accidents. Attend to these openings with care, and have them made safe in whatever way the exigencies of the plant may allow.

IMPORTANCE OF ELEVATOR SAFEGUARDS

The elevator problem concerns most of the employees, and for that reason it is specially important; but I despair of saying anything useful and intelligent about it in so short a time. It is a subject for a book, rather than for a minute. Have your elevator hoistway enclosed by a suitable housing, and provide gates or doors on the cars or cages as well as in the hoistway enclosure. Have an interlocking system, that will make it impossible to start the elevator until the gate on the car, and all of those on the hoistway are closed.

Provide suitable automatic limit-stops that will prevent the car or cage from traveling too far, by automatically shutting off the power.

Have the inside of the shaftway as free from projections as possible, so that men or loads in the cage or car cannot be caught between the platform and any such projections.

Limit the power of your hoisting motor (whatever it may be) with due reference to the load for which the elevator is judged to be safe. Don't provide a motor powerful enough to pull the cage apart, in case it catches somewhere or is grossly overloaded. It is better to install your motive power than to have a bad accident.

Provide an effective safety device of some sort, to catch the cage and hold it securely, in case the hoisting cables fail.

I cannot take up all the features of the plant in this way, but these illustrations will show the kind of thought that should be given to the safety problem. You ought to cultivate a sort of sixth sense, which we may call the safety sense. Consider every machine and every situation, and think what could go wrong with it; and then, when you have determined what the most likely causes of serious trouble may be, do your best to devise ways of preventing those troubles so far as you can, or of minimizing the consequences in case an accident should occur at any such point.

RECIPROCATING STEAM ENGINES

In the case of an ordinary reciprocating steam engine, for example, the things that are most likely to lead to serious trouble are (1) men coming in contact with moving parts, (2) overspeeding of the engine and possible bursting of the flywheel, (3) the breaking of the main drive belt, and (4) the fracture of some part of the machine in consequence of water getting into the cylinder.

To prevent men from coming into contact with the moving parts of an engine, provide good strong guards for the flywheel and its shaft, and for the main drive-belt, and for the connecting rod (unless it is already sufficiently enclosed), and for the governor balls, if the governor is of the stationary, centrifugal type.

To prevent the engine from running away, you will look sharply to the governor. If it is belt-driven, you will see that suitable means are provided for maintaining a proper tension on the belt, and you will also assure yourself that the governor is so designed that if the balls fall below a pre-determined point (in consequence, for example, of the breakage of the governor belt), the steam will be wholly shut off from the engine.

You will naturally ask yourself what would be likely to happen if the governor failed to operate properly, and you would probably have a vision of extensive possible destruction of life and property, and so you would be led to install an entirely separate speed-limit stop of approved design,—something that would act quite independently of the ordinary governor, and would cut off the steam supply from the engine, quickly and positively, in case the speed should exceed some predetermined limit, a little higher than the maximum speed at which the engine may have to run in its regular operation. Moreover, you will see that the speed-limiting device and its connections are installed in such a way that they cannot be struck and rendered inoperative in case the main drive belt breaks, or in consequence of any other accident that is likely to occur. The speed-limit stop and its connections must be guarded against anything of this kind with the most scrupulous care.

Engine designers commonly place the stop-valve of the engine in or near the plane of the flywheel, and if an engine so designed runs away, the engineer is put in needless peril of his life when he goes to the valve to shut the engine down. If your engine has this defect, it is advisable to extend the stem of the main throttle-valve, or to provide sprocket and chain connections or something of that sort, so that the engineer will not have to subject himself to needless hazard, in order to shut things down.

When you contemplate the possibility of a breakage of the main drive belt, you will consider what would be likely to happen if it did break, and it may be that you would feel that a strong and heavy barrier guard should be erected at some point or points near the engine, to hold the broken belt and prevent it from killing or injuring men, or from doing heavy damage.

Finally, to forestall serious consequences from the accumulation of water in the engine cylinders, you will see that suitable relief valves are provided, and if the surroundings are such that the failure of a cylinder would be likely to imperil life or limb, you will doubtless want to erect a stout barrier guard a little way from the cylinder head, to intercept it if it blows off.

GUARDING OF BELTS, PULLEYS AND SHAFTING

Closely associated with the generation of power by an engine is the problem of distributing it to the points at which it is to be used. All belts, pulleys and shafting, which serve to transmit the power, should be safeguarded wherever they come near to any place from which a man

could reach them; and special attention should be paid, in this respect, to projecting set-screws, and to couplings and clutches. It is hardly possible to over-emphasize the importance of this part of my counsel, because experience proves that the transmission and distribution of power are responsible for a great number of exceedingly serious accidents.

I have considered the familiar steam engine in this detailed way, to show how you ought to go about things, in making up your mind about the guards that are to be installed. It seems to me that there is no other way in which we can determine what the real essentials are. Plants and workplaces differ in many ways, not only in their physical condition and in the nature of the hazards, but also in the readiness of the employees to do things in a safe and sane way; and even if we could make out a complete list of things that are truly essential in some one plant, it does not follow, at all, that the same list would be satisfactory when applied to another plant of the same type.

Look over every part of your plant, and consider what kind of an accident may happen there, and what the consequences of such an accident might be. Then you will be able to say, better than anybody else, what points it is essential to guard; and after that you will merely have to determine the form that the guard should take. In many cases the answer to this is quite easy, but in others it is unfortunately not so easy, and you will have to supplement your own inventive and constructive talent by reading safety literature, and by taking counsel with other men who have had similar problems to solve.

COMPILING AND USING ACCIDENT RECORDS

R. G. ADAIR, SUPERVISOR OF SAFETY, AMERICAN ROLLING MILL COMPANY,
MIDDLETOWN, O.

The use of accurate accident records is a vital factor in the prevention of accidents. However, the collection of figures which have no practical value is a waste of time and effort, no matter how interesting such figures may be.

In preparing accident records, it is necessary to have complete information on each individual case from the time the accident occurs until the injured worker has completed the necessary medical treatment. Usually, these individual reports are accumulated for one month and the data is then transferred to the monthly accident report. From the monthly reports information is readily available to compile records for any desired period.

The collection of accident information is greatly simplified when some system of report blank is adopted. This also insures that all departments concerned will know what other departments are doing. There are many good report forms in use which meet the requirements of the safety department. Those shown in the accompanying illustrations are used by the American Rolling Mill Company and with slight modification can be adapted to the needs of nearly any company.

Date 19..... M		ACCIDENT REPORT		Male	C. W.																										
Name		Check No.	Nationality	State Case No.																											
Address		Speaks English		S. M. W. D.																											
Department		Foreman																													
Occupation		Age		Service																											
How long at work at which engaged at time of the accident																															
Length of experience both here and elsewhere in occupation followed when injured																															
Number of hours continuously employed immediately preceding accident																															
Exact place of accident																															
How did accident happen?																															
Date and Time of Injury M. Injury neglected? Signed																															
Nature and extent of injuries																															
Classification of injuries, Minor () Major (S-S) S F																															
Describe the treatment and duration of same																															
Any additional disease? (Infection) Occupational disease Neurodermatitis																															
Hemorrhoids Eczema Malinger-ing Hernia If so describe																															
Kind of operation performed (Major S-M M)																															
Laid off by Date Probable duration of disability Days Weeks																															
Remarks																															
Date returned to Hospital Released from Hospital																															
Injury first came under observation of M. D. Attended by M.D. Nurse																															
X-Ray taken Date Photo No. This report by																															
Record of Subsequent Attention Received by Patient																															
Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Insert X if failed to report as told.																															
Date Discharged Date returned to work Disability from																															
Compensated for weeks Total amount of compensations \$																															
Monthly Case No.																															

Fig. 1

The form (Fig. 1) known as the Individual Accident Report is used throughout the several works of our company. It originates in the medical department, when medical treatment is first given to the injured individual. It is made out in triplicate; one copy for the medical department, one copy for the safety department and one copy for the foreman of the department in which the injured man is employed. This report is kept on the live file until the case is closed so that any subsequent information can be added. At the end of the month the information contained is transferred to the Monthly Accident Report.

MONTHLY ACCIDENT REPORT

The front page of the Monthly Accident Report (Fig. 2) is a summary by departments of the accident experience for the entire month. This report is compiled in the safety department and is sent out to all execu-

tives, superintendents, foremen and safety committeemen. From it, any department may compare its records with that of other departments as well as with its own previous record. This stimulates a friendly rivalry between departments and shows the safety department where concentrated effort is most needed.

REPORT OF ACCIDENTS FOR AUGUST 1923 Middletown Works - Middletown Division										
DEPARTMENT	MAJOR ACCIDENTS				Previous Average	DATA LOST A/G				In Plant
	Serious	Semi- Serious	Total	Total		Minor Accidents	Total Accidents	Days Lost	Previous Accidents	
B & B	0	0	0	0	.33	16	16	0	0	51290
PACEMEN	0	0	0	0	.33	41	41	0	0	19780
FOUNDRY	0	0	0	0	.33	21	21	0	0	18546
INSPECTION	0	0	0	0	.11	21	21	0	0	10225
GENERAL LABOR	1	0	0	1	.22	114	115	11	0	51491
MAINTENANCE	0	0	0	0	.00	1	1	0	0	2822
Elect. Cons.	0	0	0	0	.00	2	2	0	0	7025
Elect. Repair	0	0	0	0	.00	3	3	0	0	4800
Garage	0	0	0	0	.00	3	3	0	0	2949
Welders	0	0	0	0	.00	3	3	0	0	6412
B & B Elec.	0	0	0	0	.00	5	5	0	0	6374
O. H. Elec.	0	0	0	0	.00	10	10	0	0	16780
S. H. Elec.	0	0	0	0	.11	2	2	0	0	4724
C. W. Elec.	0	0	0	0	.00	8	8	0	0	7425
Carpenter Shop	0	0	0	0	.11	1	1	0	0	2731
Car Repair	0	0	0	0	.00	11	11	0	0	12543
Machine Shop	0	0	0	0	.00	2	2	0	0	4047
Pipe Shop	0	0	0	0	.11	6	6	0	0	12067
Power House	0	0	0	0	.00	4	4	0	0	3845
Riggers	0	0	0	0	.11	3	3	0	0	11348
Roundhouse	0	0	0	0	.00	7	7	0	0	3851
Smith Shop	0	0	0	0	.00	4	4	0	0	7844
B & B Mech.	0	0	0	0	.11	1	1	0	0	3742
C. H. Mech.	0	0	0	0	.33	3	3	0	0	6310
S. H. Mech.	0	0	0	0	.00	1	1	0	0	5879
C. W. Mech.	0	0	0	0	.00	5	5	0	0	2046
MACHINERY	0	0	0	0	.00	6	6	0	0	101808
MISCELLANEOUS	0	0	0	0	.00	6	6	0	0	
OPEN HEARTH	1	0	0	1	1.44	52	53	12	0	51587
STEEL & FOUNDRY										
Processing	2	0	0	2	1.33	150	152	5	0	74901
E. Works	0	0	0	0	.00	0	0	0	0	2277
C. Works	0	0	0	0	.22	23	23	0	0	19826
Galvanizing	0	0	0	0	.64	121	121	0	0	42714
Fin-Shipping	0	0	0	0						
Hot Mills	0	0	0	0	2.77	194	194	0	0	200978
E. Works	0	0	0	0	.56	44	44	0	0	31266
C. Works	0	0	0	0	.22	2	2	0	0	13450
STONE	0	0	0	0	.33	4	4	0	0	6423
TRANSPORTATION	0	0	0	0						
TOTALS	4	0	0	4	3.88	587	591	28	0	548245

MAJOR ACCIDENTS: Serious - any accident causing a man to be absent from work for more than the remainder of the shift, turn or day on which the injury was received.
Semi-Serious - any accident causing a man to be absent from his regular work for more than the remainder of the shift, turn or day on which the injury was received, but which does not prevent him from doing other work. Also compensation cases in which the man loses no time from work.
FATALS: Any accident resulting in death.
MINOR ACCIDENTS: All other accidents.

Fig. 2

The accident classification used by the American Rolling Mill Company differs from the classification in general use and was adopted as a means of preventing more accidents. We operated for many years under the "lost time" accident classification and it was found that some foremen were taking advantage of the very wide loophole in that definition. They were switching workmen here and there and improvising light jobs to take care of injured men who would otherwise become lost time

cases, and thus show on the record. In our plants, as in many others, there was a tendency for foremen to expend more effort in finding light jobs for injured workmen than in preventing the accident. Under our present classification of major and minor accidents, this temptation is removed. Whether the injured man loses time or not, if he is unable to continue on the job at which he was injured, the accident becomes a major one which is tabulatable and enters into the frequency record. With this classification, we are no longer fooling ourselves. Because the accident record is bound to tell the truth, it becomes a decided incentive to all foremen to prevent accidents rather than to bury them.

The second page of the monthly accident report (Fig. 3) gives the detailed account of individual accidents, charging them to the proper department and to the foreman under whom the man was working at the

time of the accident. From the two pages of the monthly accident report we can compile any accident statistics wanted.

For all practical purposes there are only three kinds of accident records that are of any value: those which show the frequency of accidents; those which show the severity and those which classify accidents as to

MAJOR ACCIDENTS FOR AUGUST 1925					
CRUCE #	NAME	FOREMAN	DATE	HOW HURT	DAYS LOST
Labor 7152	Andrew Hendricks	Miller	8-20	Incision on right lower leg - was eating lunch in Open Hearth pit; ran to get out of way of ladle crane and struck leg on piece of pit scrap. Serious.	11
E. Open Hearth 2400	Earl Bell	Malney	8-6	Severe contusion of left foot - stepped onto charging buggy bumpers which were raised, squeezing foot. Serious.	12
E. Open Hearth 5144	Washington Grimes	H. Mitchell	8-23	Fractured 1st. right finger - while hooking spider legs to lift of sheets finger was caught in clevis. Serious.	5
5599	Winifred McElaine	Murphy	8-23	2nd. degree burn over entire face - was lighting gas in furnace which flared out into face. Serious.	2
Total Days Lost Due to August Accidents					28
LOST TIME DUE TO PREVIOUS INJURY					
None					
Total Days Lost					28

Fig. 3

cause. The management and operating executives are interested primarily in the cost of accidents which is best shown by the severity record. Foremen and workmen should be appealed to through frequency records, because, to them, every accident is a potential serious accident. The safety department receives valuable information from the study of these records, particularly the classification as to cause. Statistics of any description are more readily understandable when presented in the form of graphic charts which need no explanation.

COMPUTING FREQUENCY

For the executives, the safety department and others who fully understand the significance of the frequency rate, there is no more accurate way of computing frequency as the method adopted by the International Association of Industrial Accident Boards and Commissions. (See Fig. 4.) When computed by this method, the frequency rate shows the number of accidents per million hours worked. All frequency rates for publication and for comparison with those of other companies should be prepared on this basis.

There may be, however, a proper place to use frequency charts computed on a different basis. Some foremen and workmen find it easier to understand frequency when presented in terms of the number of accidents per hundred men employed. (See Fig. 5.) To them, the man represents the hazard, regardless of the number of hours he may be exposed. If the rank and file understand it better that way, the accident frequency should be shown to them on that basis.

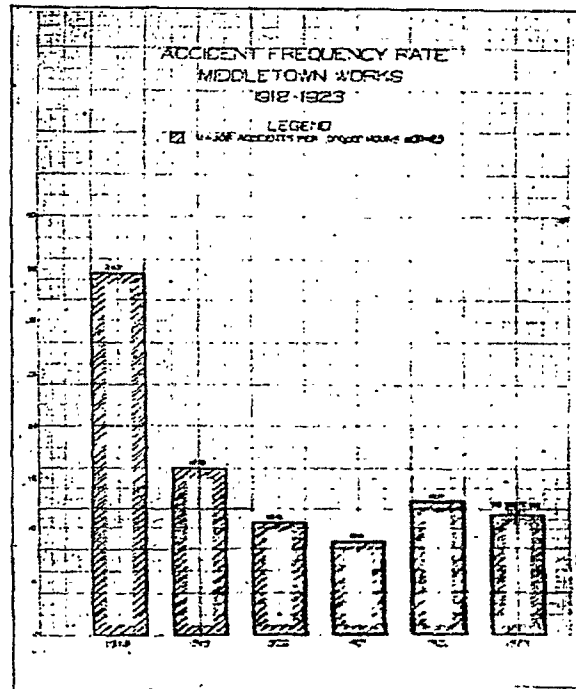


Fig. 4

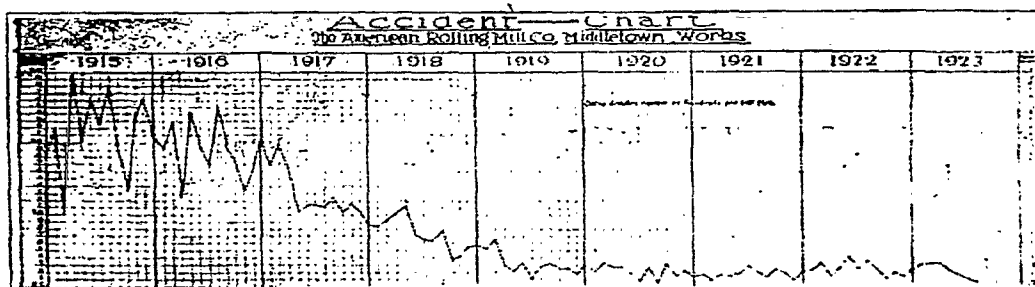


Fig. 5.

Very good results can be obtained by using a frequency chart which shows the actual number of accidents as they occur. This can be a chart of the thermometer type (Fig. 6) which shows the actual number of accidents to date this year compared to the average number for the past five years. When an accident occurs, the thermometer rises. This arouses keen interest in making each year's record better than the preceding one. This chart should be displayed permanently in a location where the entire organization can see it.

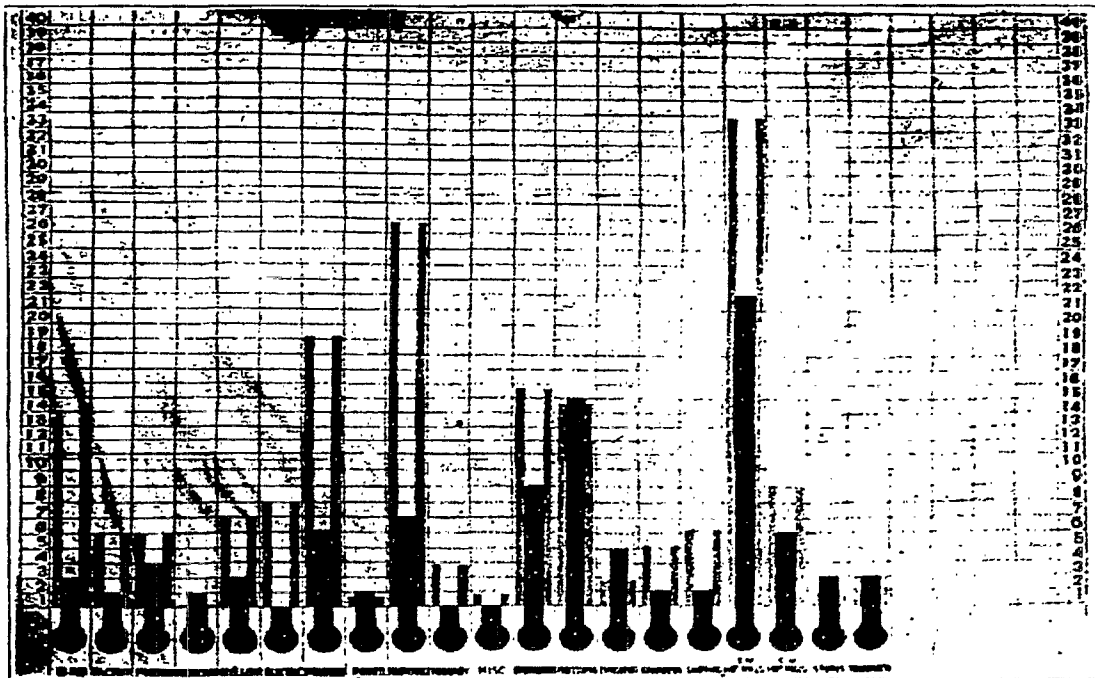


Fig. 6.

The most satisfactory way of computing accident severity is the method adopted by the International Association of Industrial Accident Boards and Commissions. This method expresses the severity rate as the number of days lost, both actual and computed, per thousand hours worked. (See Fig. 7.) It is possible and desirable to show not only the total severity rate for any specified period, but also the severity rate classified as to causes. In other words it is a simple matter to compute the severity rate for temporary disability, permanent disability and deaths, the sum of which will make up the total severity rate.

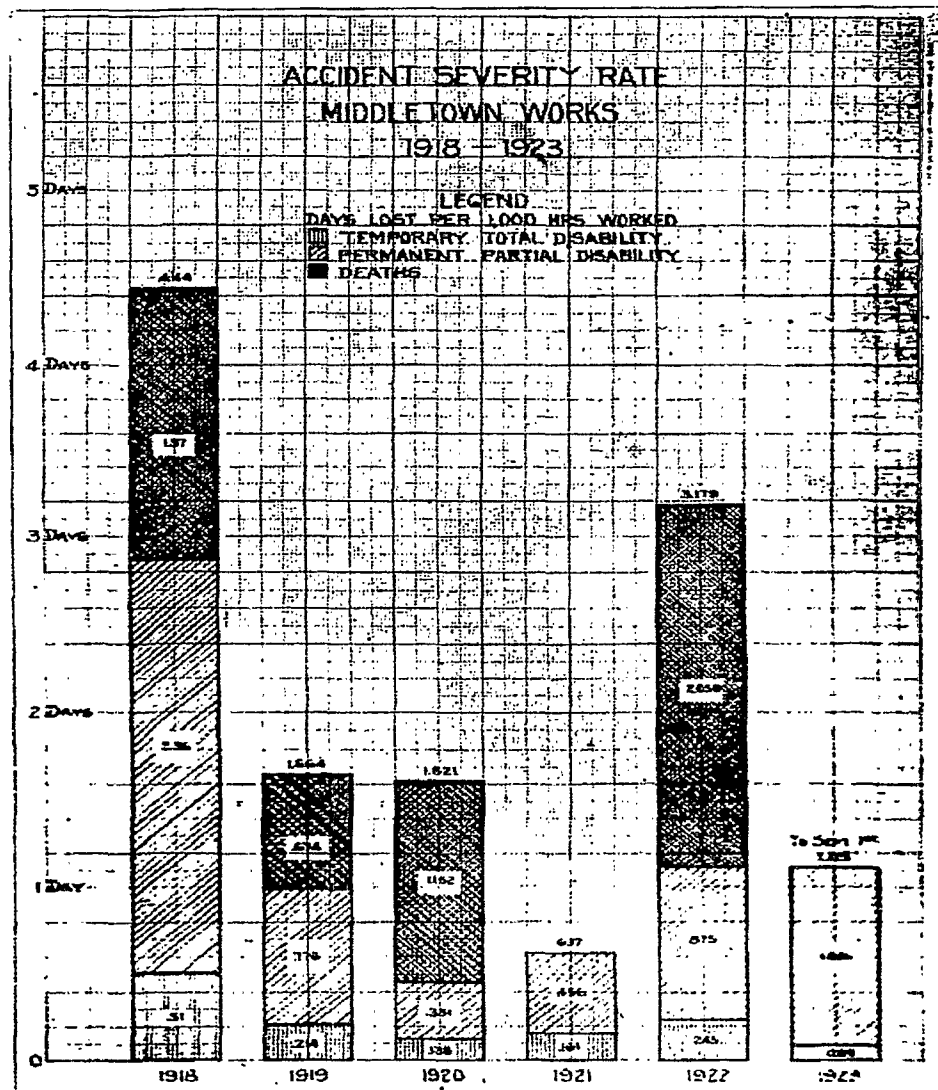


Fig. 7.

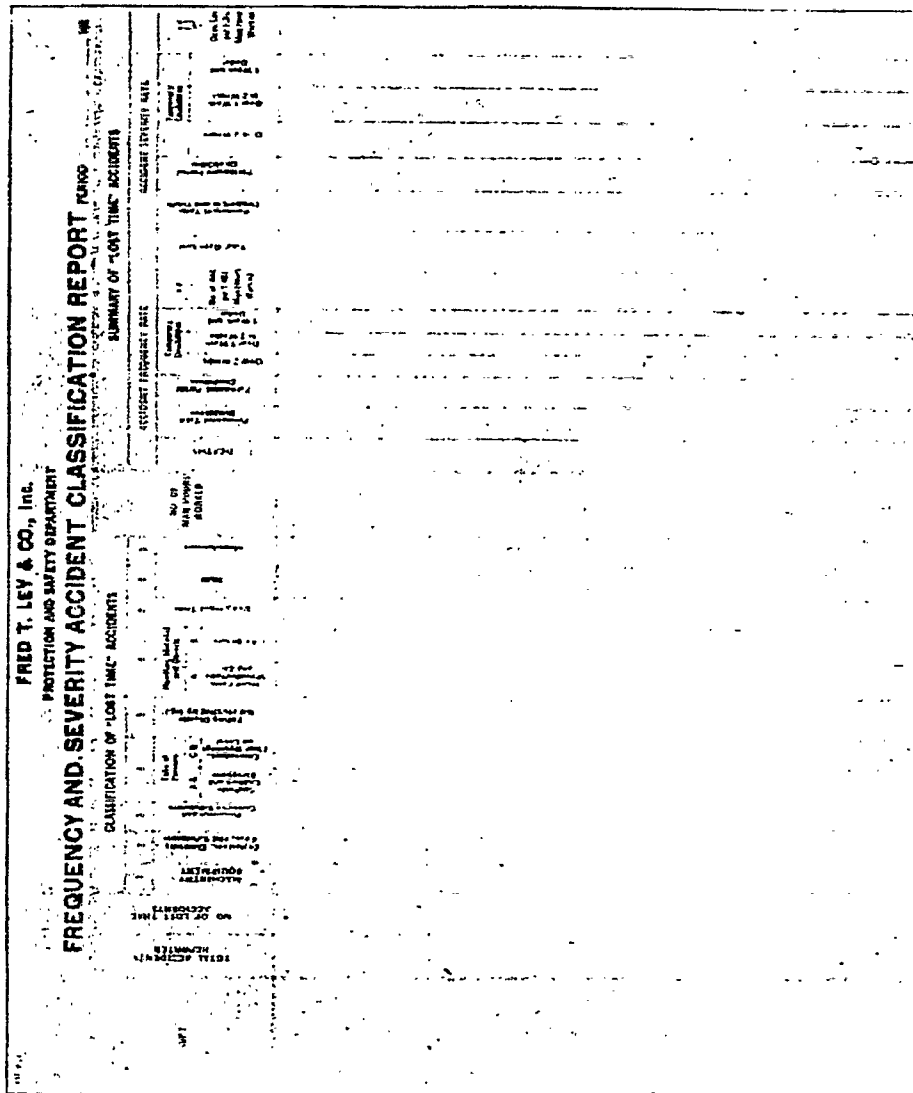


Fig. 8.

In computing standard frequency and severity rates, the process is considerably simplified by first preparing a summary of the necessary statistics. This is easily accomplished by using a form similar to the sample report furnished by Fred T. Ley & Co., Inc. (Fig. 8) This report also provides a place for the classification of accidents as to cause.

The chart shown in the accompanying illustrations show the progress of safety work at the American Rolling Mill Company. The experience they reveal is neither the best nor the worst in the industry but we firmly believe that the judicious use of accident records has played an important part in the prevention of accidents.

SAFETY COMMITTEES

ARTHUR H. YOUNG, MANAGER, INDUSTRIAL RELATIONS DEPARTMENT, INTERNATIONAL HARVESTER COMPANY, CHICAGO, ILL.

We will all admit, on the merest analysis, that successful safety work requires 100 per cent not co-operation but participation. If we have a plant in which our plant organization, superintendents, foremen and all supervisory forces are keyed up to the limit and wholly efficient, and yet if one single workman withholds his enthusiasm and his entire participation in safety work, we have the potentialities of accidental injury to himself or to his fellow-workmen.

It is a basic principle of psychology that we are *mildly* interested in what other people do to us or at us, and we are *intensely* interested in the thing we do ourselves.

Safety committees are almost the sole medium for securing 100 per cent participation by all of the factors that make up the industrial equation. In them, the owners of the business, the management, the supervisory forces and the workmen all can participate. Nothing can be more deadly, however, than a safety committee poorly organized and functioning as if it were an inquest rather than a safety committee. Nothing can be more destructive of safety morale than committee work so organized that suggestions requested, when made, receive no attention, or when if they do receive attention, the full history of their consideration, adoption or rejection is not carried back to the originator of the suggestion.

I would counsel first and foremost in safety work, a proper mechanical safeguarding, an indication by the management of its willingness to spend money and start upon the fulfillment of its responsibility. Following that, to secure the co-operation of every one, the participation of every one in the organization of safety committees of mixed groups, not safety committees of foremen alone nor of workmen alone, but of mixed management, supervisory and workmen groups for a particular purpose which I will touch upon later.

A prerequisite to the success of the committee will be the setting of a definite periodic date for meeting, not leaving it to the chance call of a chairman, but at the start letting it be known that this safety committee meets on every second Thursday, or every Monday, or once a month on a particular date, and that nothing may interfere to prevent the meeting of that committee.

INVESTIGATION OF ACCIDENTS

The committee should be given power to investigate the cause of every serious accident and fix responsibility. It should make periodic inspections, and its meetings should be meetings of record; that is, minutes should be kept, and every suggestion discussed by that committee or submitted to it should be carried on the open file until finally disposed of.

I don't think I can over-emphasize that particular point, and, after all, it means but a very little organization work. You should have a

card system containing the suggestions offered by title and number, and then simply keep them in the open file with periodic reports until they are finally disposed of, no matter how long that may be. You safety workers who have your problems and have your difficulties sometimes in securing the attention of your management, will find a potent force at your disposal in the mere maintenance of such a record which will indict sluggish management for inattention to items which should be cared for. You will find a growing satisfaction among the men with whom you are working, the workmen in the shop, in being able at all times to tell them of the progress being made toward the successful carrying out of a suggestion.

I think in no place quite so much as in the conduct of safety committee meetings can the truly ideal characteristics of a safety inspector or safety engineer be shown. To my mind, the success of the safety inspector rests mostly on his personality. The technique of the game is little or nothing at the start. Any man or woman of average intelligence can quickly acquire it, and in no profession, in no endeavor can it be so quickly acquired as in safety because of the whole-hearted exchange of experiences, good, bad and indifferent, that is had in such conferences as these and among safety men. The technique can be quickly acquired. But the most essential thing in personality, and by that I mean the possession of a vision, which means almost a consecration to service in this cause, and by which there comes automatically an ability to submerge yourself, a willingness to step into the background, not always to carry the banner, to be anxious that full credit and more than full credit be given to workmen and to foremen and to all members of the organization.

I think, also, the conduct of safety committees calls for a demonstration of tactfulness and diplomacy and real statesmanship that is not matched by a Balfour or Hughes or any of the men who are in the lime-light in that respect.

SAFETY AS MORALE BUILDER

Safety is, after all, a morale builder. All of the educative influence that we bring to bear to make the naturally careless man habitually careful, brings automatically with it a desire for precision of workmanship, for good housekeeping, for conservation of material as well as of life, that goes to improve the morale of the shop, and it has a definite by-product in that respect. But transcending that, the value, as I see it, of safety committees, a value not only in the industrial stratum but a definite political and social value, is the opportunity of bringing all of the factors in industry—owners, directors, management, supervisors, workmen—around a conference table on a wholly non-controversial subject. It is altogether different from wages or hours or working conditions. It is altogether different from anything else we have almost except religion. Safety has no negative values. Participation in it by any one and every one brings a wealth of satisfaction and a definite economic gain to each and every participant, with no losses on any side.

The management, the owners of the business, make money on successful safety work. The men are saved days of suffering and their lives are saved. Here we have an opportunity that is more and more being realized by men in American management, and, thank God, here in America, our captains of industry rise from the ranks, and they find that they are of the same common clay, and the workmen find that they have the same common clay. They begin to realize that each other's problems have weight, that consideration of safety items automatically can be made to include consideration of other items, and we find in safety committees, that men and management can meet together on at least one point of contact without controversy, and it is the wise manager and it is the wise safety inspector who will see in that medium an opportunity for solving industrial ills that can only be solved by direct contact, and who can see a vision of contribution to the political and social well being of the world through such a medium.

THE BULLETIN BOARD—AN INDISPENSABLE SAFETY ADVERTISER

R. T. SOLENSTEN, BULLETIN EDITOR, NATIONAL SAFETY COUNCIL, CHICAGO, ILL.

Advertising is the most powerful force in modern commercial life for popularizing any product manufactured for general consumption. It disseminates information, creates demand, convinces the prospect, sells the goods. It tells you all about an article; then it makes you feel you would like to have it. Then it makes you feel that you ought to have it, and then it makes you buy it.

It is advertising that has put Ivory Soap in the bath-tubs of the nation. It is advertising that makes babies cry for Castoria, and it is advertising that induces a man to walk a mile for a Camel.

The right kind of advertising will put on the map any product that has merit in meeting a human want, and what advertising will do for the commercial product, it will do for safety.

Safety work, of course, is more than advertising, but the kind of advertising or publicity or educational publicity which we are discussing here is absolutely essential to success in any campaign to reduce accidents. The reason for that is that so many of the accidental injuries that occur are within control of the workers themselves. They are accidents that can not be prevented by safeguards, that can be prevented only by the workmen themselves.

Proper advertising of a safety character will bring home to the workmen what accidents mean to them. It will show them how to avoid injury, and it will create good will and cooperation for your accident prevention work. In other words, it will sell them Safety.

The bulletin board is so cheap to install, so economical to maintain and so effective in its influence when properly posted, that it has come to be regarded as an absolutely indispensable medium of safety publicity.

Ask any successful safety engineer, and he will tell you that an executive trying to conduct safety work in an industrial establishment without a bulletin board is like a seven year old boy trying to sing bass—he hasn't got the voice. The bulletin board is the voice of the management, instructing, warning, reminding, encouraging the employees, and inspiring them to put forth greater effort and more sincere effort to avoid accidents. Your bulletin board thus becomes an influence in the plant, not merely a piece of equipment, and the scope and character of that influence will depend only upon how you talk to your employees and what you say to them. In other words, it will depend upon what you post on the bulletin boards.

The experience of the safety movement to date has proved conclusively that illustrated safety bulletins and posters constitute the best form of publicity upon which the safety engineer should rely for his principal form of bulletin board communication. These bulletins—I have in mind now particularly the bulletins prepared by the National Safety Council—are prepared in accordance with correct advertising principles. They attract attention, they hold the interest, they put over the message, and they get the reaction desired.

FUNCTIONS OF SAFETY BULLETIN

What are the functions of a safety bulletin? As I see them, there are three. First, to stimulate safety thinking. Second, to create good will for the safety work that is being conducted in the plant. Third, to instruct the workers in safe practices and warn them against unsafe practices. A bulletin or poster that will not do one or more of these things is not worth posting.

Now I am going to enumerate briefly five principles of bulletin board practice. The first is to place your bulletin board in a conspicuous location where the worker will not fail to see it. The advertiser demands preferred space in magazines and newspapers. Why shouldn't the safety engineer insist upon preferred locations for his advertising medium? Adjoining a time clock is a good place for a bulletin board, particularly if it is so arranged that it can be read by the men as they stand in line to punch the clock. Other desirable locations are in the locker rooms, the dressing rooms, points in the work-room where men are obliged to pass during the day, in smoking rooms if you have them, or in place where men congregate to spend a few moments of their leisure time during the lunch period. Plant entrances and exits are not usually regarded as the most desirable locations, because men are always in a hurry to get in and out of the plant.

The best type of bulletin board is a cabinet equipped with glass doors which can be locked. Good lighting is required whatever type of board you use. Of course, the most important thing in bulletin board publicity is not the board but the material which you place on the board. Nevertheless, if you provide a good, substantial, attractive, self-illuminated bulletin board, it will attach greater dignity to your enterprise and make a better impression upon your workmen.

The second principle of good bulletin board practice is to use the best bulletins which can be obtained or prepared. Now, what are the qualifications of a good safety bulletin? In the first place, it must attract attention; it must have high attention value. One must bear in mind that the reading of safety bulletins is a voluntary act on the part of the employee. If your bulletin board doesn't attract attention, your messages will not be read, and if your safety bulletins are not read, your efforts are wasted.

The elements which make for attractive display in a bulletin are color, illustration, decoration, typography and lay-out. The proper use of these elements is governed by well-defined principles which must be followed if the result is to be effective. In the second place, your bulletin must have a message which will be understood quickly and clearly. The entire bulletin board should be read in two or three minutes. The copy should be written with clearness, coherence and emphasis. Your entire portrayals should be vivid. All unnecessary details should be eliminated, and all the elements both of copy and display must be related and coordinated to produce the one effect for which the poster was created. That is what we call punch in a bulletin.

MUST REGISTER PERMANENT IMPRESSION

The thing to aim at is to register a permanent impression, and we must be brief and concise and aim at getting one idea over, fixing one impression in the mind and doing it quickly and in such a way that the message will be remembered.

Bulletins should be pleasingly striking, not shockingly repulsive. Copy should be comprehensible to a fourteen year old boy. It should preferably be written in such a way that the reader will infer the message. That is always more interesting and effective than to tell him directly and bluntly exactly what you mean. But be sure you word your message so that he will infer exactly what you want him to infer.

One thing to be avoided in the preparation of bulletins is the constant harping on the word "careless" or "carelessness." As a matter of fact this word is misused so often in bulletins that it probably would be better not to use it at all. Of the last group of 108 bulletins prepared by the National Safety Council, there is only one bulletin which contains the word "careless." We feel that the workman resents being hounded for this cause of accidents, and that if we harp on that word continually we are likely to make him sore, and we won't get effective results from our bulletin board publicity.

Bulletins should be positive in character rather than negative. Their aim should be to direct the worker's mind toward the safe way of doing his work, not to cause him to think constantly of some horrible result that he must look out for. As a general thing, you can't scare a man into becoming a safe worker. If you do succeed in instilling perpetual fear in his mind, you simply ruin his efficiency and make him more likely to have accidents.

The third principle of good bulletin board practice is to get variety in your appeals. Most of the bulletins prepared by the Council are prepared to make an appeal to a certain instinct and to arouse in the reader the corresponding emotion for which that instinct is the basis. The emotional appeal makes the deepest and most permanent impression upon the mind of the average man. It is the quickest way to stimulate action.

We can appeal successfully to the following instincts and interests (I won't try to name them all): self-preservation, helpfulness, devotion to family, economy and saving, pride, loyalty, constructiveness, reputation, and appreciation of the comic.

I might say a word here in regard to cartoon bulletins. Some of the safety engineers do not like to use cartoon bulletins because they think that a cartoon makes a joke of the safety movement which, after all, is a very serious and high-minded enterprise. I have no defense to make for many so-called cartoons which are merely grotesque drawings and which really have no humor in them. A cartoon bulletin, like any other, must have some point to it, must have some idea to express, and in a cartoon it must be expressed cleverly and in a humorous way. Everybody appreciates cartoons. All you have to do is to watch people read the newspapers to realize that cartoons have a universal appeal. The reason is that the man reading a cartoon does not consider that he is the subject of the cartoon; it is always the other fellow. If that were not true, cartoons would not be popular with any class or group of people and there would be no cartoons published in newspapers.

By all means use cartoons on your bulletin boards if they have merit as cartoons. If you can put a touch of humor into your bulletin boards, you can help to make them more interesting.

ARRANGEMENT ADDS POWER TO MESSAGE

A fourth principle of good bulletin board practice is to give your bulletins a chance to do their work. Don't crowd your bulletin board. A board that is all plastered with bulletins and posters and clippings and things of that kind loses its effectiveness, because there is nothing but chaos and disorder and inefficiency. If the workmen look at it at all, they go away without reading anything that they saw there. Change the boards every day if you can, and if you can't do that, change them as often as possible. The idea is to give your workmen something new, something interesting to look at every day.

The fifth and most important principle in good bulletin board practice is to make your boards interesting. When all is said and done, that is the secret of bulletin board publicity. Safety bulletins in themselves are or can be made interesting, but it very often is desirable to supplement the posted bulletin with some other material which will help to intensify this interest.

I am going to show you a few bulletin board backs which I have prepared to offer some simple, concrete suggestions as to what you can do to make your boards a little more interesting and perhaps a little more attractive.

(Showing Bulletin Board.) Here I have added as an interest feature what we call little talks with men in our plant. Here is a picture of the man in the plant. I have named him Peter Zielinski, fireman. "You know Pete. Pete says he likes it here because the work is steady and because everybody is careful."

Now, a little interest feature like that can very easily be carried out by any safety engineer who has a camera, and I feel that every safety engineer ought to have a camera, because the things he can do with it are almost unlimited.

EXAMPLES OF BULLETINS

This is bound to create interest, because the friends of the men will remark about it, and the workmen will be looking to see whose picture goes on next.

(Bulletin Board.) Here I have taken one of our bulletins on the subject of dropping things on one's feet. I have tied that in with a similar accident right in the plant, showing a workman whom everybody knows and who they know has had a similar injury. Up here I say, "Please don't kid Al about this; his foot hurts enough now." And down here: "Remember the E. B. A. dance Saturday night. Keep your feet in good shape."

(Bulletin Board.) "This man struck out," using one of our bulletins and tying it in with a contrast in experience in the plant, "but Joe Bush Machine Shop Sheik, got a safe hit. This emery wheel broke while running at high speed. Joe's eye was saved because he was wise enough to wear his goggles. Goggles are free. Ask your foreman."

Here again is a large poster which has enough human interest to attract attention and to make an appeal. (Bulletin Board.) This bulletin I think you are all familiar with. It shows the picture of an orphanage, and all the children shown on the steps of this orphanage are children who have lost one or both parents on account of accidents. Such a bulletin also needs nothing to bolster it up so far as attracting attention and holding interest is concerned.

(Bulletin Board.) Another thing that almost any safety engineer can do is to get some of the men in the plant who are handy with pencil, pen or brush, to make some home-made bulletins. Here is a home-made bulletin on the subject of infection, showing how a man protects his tools but neglects himself. I have also posted up there another bulletin which is a little weak in attention value. The home-made bulletin helps to attract attention and helps to put over the message of the other bulletin. Incidentally, we have added a little local interest by labeling this as "Safety Bulletin by our own Shop Artist, Professor Foreman. The 'professor' is gratuitous."

(Bulletin Board.) Again we have a weak bulletin, bolstered by a bulletin which has human interest. You notice how these two are posted. You can arrange the two posters in different shapes and forms on the bulletin board which will help to make your board look different and a little more attractive.

Here we have two posters posted in a little different form with a little different decoration on the side, to make it a little more attractive. We also have up here what we call our Safety News Pictorial. In other words, it was supposed to be a little news picture with some comment on it that could be tied in with safety. We probably will issue more of those later on. But this has interest and will help to attract attention and put over the message here.

(Bulletin Board.) Here is a news pictorial issued by the Chicago Tribune which I have posted on here to help attract attention and add a little interest to the board carrying another safety bulletin.

In a great many cities, the daily newspapers, especially where there is competition, issue such newspaper pictorials for hanging in windows and placing in barber shops and other places, and I think you will find that a great many of them will be glad to furnish those for posting on your bulletin boards if you care to have them.

(Bulletin Board.) Here is an illustration of another home-made bulletin, using a clipping from the National Geographic Magazine. It shows two beggars in debate, one of them with his hand cut off and the other with a hand and foot cut off. The story is that these beggars were criminals, and that they were punished by having in one case a hand cut off and the other a hand and foot cut off. Up on top there I have written in with a typewriter, "Cripples, but not from accidents." Then I tell down here in a few words that these men were criminals and were punished because of crime, but that in civilized countries like ours we don't punish people in that way, but a great many people punish themselves by failing to observe safety rules and take proper interest in safety. That is something that most any man can do to make his bulletin board a little more interesting.

(Bulletin Board.) Here is a clipping from the *National Safety News* telling about the Safety Court established by the Standard Oil Co., in which a driver who has an accident is tried by his fellow-workers, and if he is found guilty of infraction of safety rules, he is sentenced to a period of manual labor in the warehouse.

(Bulletin Board.) Here I have shown how we can tie in two bulletins, the slogan bulletin with another poster, where you have a logical sequence of thought. There is a picture of a man who has been hit by the head of a sledge which was on a loose handle. Instead of saying, "Don't work with sledges with loose handles," expressing it bluntly and directly that way, we say, "Nobody has ever been smart enough to think of a good excuse for using a sledge with a loose handle; there isn't any." That is getting across the message in an indirect way, but I think you will agree with me that it is just as effective, and more so, than the other way.

The executive who has keen appreciation of the influence which can be exerted by a bulletin board for stimulating interest in safety among his employees, for developing plant spirit, for encouraging loyalty to the ideals of the firm, will place a high-grade man in charge of the bulletin board publicity. The work calls for a man who has vision, a

man who has a keen understanding of human nature, who knows how to appeal to working men, who knows news and advertising, a man who is a good psychologist, who is a good safety engineer, and who is enthusiastic over the possibility of preventing accidents through education.

Make your bulletin board an influence which will be felt throughout the entire personnel of your plant. Use bulletins freely. Make them interesting. Keep it up. Talk to your men in such a way that they will know you have their interests at heart, and you will get results in reduced number of accidents, in a better plant spirit, in more heart and thorough-going cooperation, and in a more happy, prosperous industrial family.

PUTTING PEP INTO A SAFETY CAMPAIGN

AL. KROES, DIRECTOR OF SAFETY EDUCATION, EMPLOYERS MUTUAL LIABILITY INSURANCE COMPANY, WAUSAU, WISCONSIN

A safety campaign without *PEP* is worse than useless.

For some years we have been distributing *PEP* with cards—impressing upon the worker the vital things in Safety, not only causes, but results, the effect on his home, happiness, etc. At no time, as I remember it, was there a lack of interest or appreciation.

Now then, in order to get the right slant on all this, imagine yourself to be the man on the job, gathered somewhere in the shop to hear the message. A safety campaign is being conducted but the edges are kind of worn off; the bulletin board has nothing new; a few old posters are hanging on one tack and the last notice is three weeks old. Accidents are on the increase, a bad infection case is holding the center of the stage and all is gloom. The safety drive so well started is all but dead and even the safety committee is a "paper" organization pure and simple.

At this critical stage we need a *PEP PULLMOTOR*—a message of facts rather than figures. We must bring the man face to face with accident causes and what it means to him and the folks at home. We must make him fully understand that he plays a vital part in a campaign which can do so much to scatter the seeds of safety, to stay with helpful hands, to the grief of "safety last" and speed the rosy dawn of a new day—where the preventable accident will be classed as a crime.

It is hard to get the idea straight into our head that safety can do all this, but you can easily bet your next month's pay check that it can do just that and more. The heart and soul of the safety movement is to get you to believe all of that. It has always been a mystery to me how it took so many years to bring this vital thing close enough so that we can all see it and firmly believe it.

It is easy to see it after the accident happens—after a man has a violent death or serious injury, being caught in a fast whirling spiral. After we see that awful thing and feel in our hearts the sorrow and despair in the family circle of the victim, the attending grief of a broken home, then we all get very busy and guard that shaft so further danger is impossible.

We all see the elevator gate tied up, and with amazing indifference walk by it, instead of cutting the rope that keeps it tied up or taking away the stick that someone has put under it in strict violation of all shop rules, but when we see some poor fellow fall down the elevator shaft and hear his cries of agony, when we see the ambulance backed up against the gate of the factory and have our shop brother taken away in it, then, the scales fall from our eyes and we make that gate safe as it should be.

We can easily see the man at the emery wheel working without goggles, the sparks flying in every direction like a brilliant display of fireworks. We see the man with his eyes full of emery dust or perhaps a chip. We know the danger. Perhaps some amateur oculist put this fellow against the wall and pokes into his precious eye with a tooth pick or a lead pencil or soiled handkerchief. We care very little, but when later on we hear that Jack lost his eye through a hopeless infection, we see the danger vividly and we have learned a costly lesson.

We thoughtlessly walk by a fellow who is working on a saw totally unguarded. We know very well he is in constant danger of losing his fingers or perhaps his hand, but we say nothing. When the fingers are gone or his right hand has ceased to be his best friend, we get busy and correct the evil.

We walk by the yawning floor opening without a sign of a railing, unmindful of the danger to some of our shop fellows. We don't seem to care, but all of a sudden some poor fellow falls into it and breaks his leg or perhaps receives a more serious injury, and we all blame the fellow who is charged with the responsibility of guarding this danger point.

We see high piles of material dangerously leaning, like the Tower of Pisa. We even hear someone remark: "Some day that darn thing is going to come down," but we quietly pass on our way. When it topples over and one of our shop neighbors is caught underneath and perhaps loses his life we wake up to the danger of piling material carelessly.

There is a door leading out into the yard with the railroad track nearby. We all know that the safety gate placed there for our protection has been smashed off the hinges, but no one seems to take interest enough to report it. Then comes a busy day. Our mind is taken up with some hurry job. We dash out of that door and are crushed under the wheels of a passing yard train. Everyone in the shop is excited. The gate is repaired, but one of our fellow men had to die to call attention to it.

We know that the chain which holds a suspended load has not been annealed for a long, long time. Every day we are taking a big chance passing under it, but we haven't got the stamina to take a positive stand and see that it is made safe. One day some poor fellow is crushed under the heavy load and loses his life. Then for a brief period of time every attention is paid to annealing these chains until we again fall into a state of indifference, and forget.

We see a shop worker swinging a heavy sledge hammer. We know that tool inspection has been neglected. Blow after blow is given until suddenly the head flies off, hitting some poor fellow in the head with fatal results. Then we see that a defective tool is a great source of danger, but unfortunately we don't see it until the damage is done.

We notice some fellows in the shop passing us time and time again with any old rag around their finger or hand where the skin has been cut, but we don't see the danger of blood-poisoning. Later on we hear that one of our best pals in the shop is suffering frightful agony at the hospital, being the victim of a serious infection. Neglect of going to the first aid room and making light of small injuries has been the direct cause of this man losing his hand.

Day after day we notice a protruding set screw on a shaft near the point where the oiler must go every morning. We don't see it as we should and some fine morning this oiler is caught by a ragged sleeve and is so badly injured that the arm has to be amputated. We all feel sorry, but a better interest in safety first at the right time would have avoided this horrible accident.

FORESIGHT, ONLY SOLUTION TO SAFETY PROBLEM

I could mention a lot of more things that happen every day in the thousands of workplaces everywhere, but it is quite enough to convince us that to see these things before the accident is a real solution of the safety problem. It all depends on the degree of interest. Way down deep in our hearts lies the desire to do right. We must direct our forces against the demon of indifference. There must never be a let up. We must see all these things in time. It also depends on the eternal willingness to help and be of service to our fellow men. The question is, "Are we willing to consecrate our lives to the greater things"?

And then again, towering far above everything that is said here, comes the *HOME*. All your interest, all the service you can give to cut down accidents in some way will make the home happier.

HOME, that wonderful place where Jack and Mary are by the gate to await Daddy's safe return. That's the spot where the lightning strikes when the ambulance takes another victim from the shop. And sometimes we forget the importance of Mother's part—the struggle she has to get along. Think what a real man's job it is to make that home safe.

Accident prevention is your privilege and a sacred duty. The world points the finger of scorn to the man who would not lend a helping hand in this great work. If you now belong to the "I don't worry club," cancel your membership today. With the rising of the sun tomorrow dedicate yourself to the greater service—to that wonderful service of helplessness. A better day of more genuine brotherhood of man is waiting just around the corner. Let's all help and hasten the day.

Carelessness has cursed humanity throughout the ages. In the complexity of a busy day in the shop we are all apt to forget. We slide back into a state of indifference which is full of danger. At times we are at sea. We are much like the ship tossed about in the storm. Imagine

yourself standing on the edge of a great lake. There is a long pier and on the end a lighthouse, great waves beating against it. The storm is at its height. It is pitch dark, but faithfully, without interruption, the light flashes throughout the inky night. Once in a while we see the moon emerging from the dark clouds and notice a ship buffeted by the high angry waves with upper structure swept away, but the good skipper keeps a sturdy hand on the wheel and never for a moment loses sight of the guiding light flashes. Finally, after a long and heroic struggle he reaches the safety of the inner harbor. What a wonderful inspiration. That lighthouse is your Safety First. Keep your eye trained on it always.

My friends, this is a serious matter. The crimson record of preventable accidents in this our fair land, will find a responsive chord in your heart. You have done much to advance this mightly safety movement. No matter from what angle I treat the subject I know that you understand. The noble work has become an integral part of your life and, after all, there is a tremendous difference between just making a living and making a life.

To you men, dependable pilots of the good ship "Safety First," I have but one appeal; Sail on—sail on!

PRONE PRESSURE DEMONSTRATION

S. H. REID, BUREAU OF SAFETY, CHICAGO, ILL.

During the last two or three years, we have heard a good deal about safety and about service to humanity. The matter of service has perhaps been emphasized more at this Congress than at any previous one. A good many years ago, I read a story that has made more impression upon my life in the line of service than any other one thing. Some of you may have read the same story.

A certain man was going from Jerusalem down to Jericho, and he fell among robbers who stripped him of his raiment and left him for dead. By and by, along came a priest, and the priest walked by on the other side and went on about his business. Later a Levite came by, and he saw the man in his distress, but he, too, passed by on the other side and left him to suffer. Then the good Samaritan came along, and he got down off his beast and rendered the necessary first aid, took the man to a hotel, and made the necessary provision for his care until the time of his recovery. That is what I call real service.

There are a good many kinds of service that we can render to humanity in connection with our safety work, and during the week we have heard a good deal about the care of the injured, about how to tie up wounds, how to take care of broken legs and broken arms, and so on, and that is well. It certainly is a commendable and praiseworthy service. But there is one class of service that is unlike those which I have mentioned. We can not wait for the services of the doctor, because when a man is suffering from an electrical shock or is apparently dead from drowning or is suffering from asphyxiation, the doctor is usually somewhere else at the time of the injury, and so it is necessary in those injuries which

I have mentioned and others which interfere with a man's breathing, that first aid be administered immediately and right on the spot where the accidents happens.

That is particularly true of electrical shock. It is one of the things that can not wait. It has been said repeatedly that a man can do without anything to eat for a period of possibly forty days. He can do without a drink of water for three days. But a man's life is in danger when he is deprived of air for three minutes.

I don't mean to say by that that if you were unable to get to a patient within three minutes from the time he received the shock, that you should not do all you can to help him, or that your efforts would be useless. But I do say that a man's life is in danger when he is deprived of air for three minutes.

When a man receives an electric shock, he is deprived of air, and then smothers to death. If you want to know what it means to be smothered to death or to be deprived of air, just pull out your watch some time and try to hold your breath for three minutes. Then you will appreciate what the person is up against who is deprived of air.

RELATION OF DIAPHRAGM TO BREATHING

Remember that the lungs have no power within themselves to inhale or exhale. Your breathing is dependent entirely upon the diaphragm, and when a person receives an electrical shock, the muscles or the nervous system controlling the diaphragm is paralyzed and the diaphragm ceases to perform its function. Ordinarily, in your chest and mine right now, it is moving up and down at the rate of about fifteen times a minute, and it does that just as regularly and constantly as the beat of your heart, and it is just as essential to your life.

There are many other injuries in connection with electric shock—electric burns, etc. We read a good deal about the effect that it has upon the heart and upon the nervous system generally and upon the blood vessels, and all that sort of thing. We are not interested in that particularly. These are matters for the physician to handle. But when a person gets an electrical shock, it is your business and mine to see that he gets air in and out of his lungs, because that is the first necessity for the saving of his life, and we leave the heart and blood vessels and nervous system to be taken care of either through nature or by the physician.

It is obvious that the first and important thing in cases of electric shock is to get the patient free from the thing that gives him the shock and do that without danger to yourself. Many a person has been killed in attempting to free some one from a live wire, and then, having done that, you get the patient in the prone method, that is, lying flat on his face.

Many thousands of people are drowned in this country in a year, many people are electrocuted, and many suffer from asphyxiation, and many of these no doubt could be saved if there was some one around who knew how to give this particular part of the first aid.

The simplicity of this method commends itself to the ordinary individual. It requires no apparatus or equipment other than the hands of the operator, and these they always have with them. Any other device might be away somewhere else, in the fire department or in a hospital, and by the time you would get it to the patient, it would be too late to do anything.

EXAMPLES OF FIRST AID PRACTICE

If I had time, I would like to tell you of some of the cases during the year 1923 where this method has been successful in saving life. I will mention one or two. I know of one man that received a shock from a 33,000 volt wire. They worked on that man, according to this method for three hours and twenty minutes before there were any signs of life. I have known of other cases where they worked two hours and a half, an hour and a half, twenty minutes, ten minutes. Sometimes they come around all right in five minutes. But it is our business to work until the patient is absolutely dead, that is, until rigor mortis sets in. Then we know we have done all we can.

This summer, a hundred miles or so from Chicago, a man who is in this room now, and one of those associated with us in our work in Chicago, had occasion to go out to one of the camps. A man had been in bathing, got out beyond his depth, and went under, and it was some five or six minutes before they got him out of the water. There the man lay on the grass, everybody excited, nobody knew what to do. This gentleman from Chicago who had had experience in working on voluntary subjects as well as others, knew exactly what to do, and when he came upon the scene, he scattered the crowd and went to work on the patient, and in less than half an hour the man was all right, and a day or two later, he was no worse for the experience.

This doesn't require a great deal of skill. It does require some practice, because this is one of the things that you have to learn to do by doing. You folks, when you went to school, remember when the teacher put a letter upon the board. You could have been there yet and watched the teacher do that, but you never learned how to make the letter S or the letter A or the figure 3 or any other figure until you took the chalk in your own hands or the pencil in your own hands and made it. In other words, you learned to make those letters by making them. We learn to give artificial respiration by giving artificial respiration, and, necessarily, we must practice on voluntary subjects so that when the emergency arises and there is a real case, we will be able to perform this necessary first aid with satisfaction to ourselves and benefit to the patient.

Now, I said that it doesn't take a great deal of training. I am going to try to prove that to you. We have three young men up here. Here is a young man twelve years old. Up until three-quarters of an hour ago, he had never seen the Prone Pressure Method of Resuscitation, he had never seen artificial respiration and therefore knew nothing about it.

I took him up to the room upstairs and just gave him about five minutes' training, and if he doesn't do quite as well as some of you folks think you can do, of course you will understand that he has only had five minutes' training.

DEMONSTRATION

I just want to emphasize, folks, that this is one feature of first aid that is your business and my business, because if we don't practice it and become proficient in it, the time is going to come when we are going to be placed in a mighty embarrassing position because of our inability to save somebody's life. Obviously, there will be many cases that are beyond hope, but neither you nor I nor even the doctor, if he happened to be there, can tell which case is hopeless and which one is not, so the thing to do is to give the patient the benefit of the doubt and give him our best efforts, our best service, until we are sure that there is no hope or that he has been restored to consciousness and life.

ADJOURNMENT.

General Round Table

October 4, 1923

H. W. FORSTER, Chairman

Independence Bureau, Philadelphia, Pa.

CHAIRMAN FORSTER: You will observe our problem of getting safety across to the new man is divided into two parts, the non-English speaking men and the men working in scattered small groups. We might take a given group of men and get them trained in safety in first class style, and it would be wonderful if we were able to keep them. But always at every industrial plant we have a steady influx of new men, and we have to get to them and to put the message into their hearts. Let us confine the discussion during the first part of the afternoon to the non-English speaking workman.

Mr. Henry A. Reninger (Lehigh Portland Cement Co.): We in the cement industry, considering approximately a three or four thousand barrel plant, run those mills today with anywhere from 250 to 350 men, and with three shifts you can see that we never have a great number of men at the plant. That includes all the men, including quarries.

Bulletin service, to my mind, is the greatest thing for the foreigner. Keep your bulletin boards clean and fresh with new material. Even though he cannot understand a word that is on the bulletin, the picture will impress itself upon his mind, especially if the man has been impressed with the safety idea and made to understand that the company is vitally interested in it, not from a financial standpoint but for his own sake.

We have mass meetings twice a year when everybody attends. The mills are practically shut down. At those meetings we have two or three foreigners talk on safety, and while I personally cannot understand Czechoslovakian or Polish or some of the rest of those languages, I can tell by watching the faces of the men that the messages are getting across.

Another thing is the awarding of trophies. You can impress the men in the mill that they are in a contest, in a safety campaign for a no-accident period, and if they win they get a trophy. That is placed out where they can all see it.

Mr. J. E. Walters (General Electric Co.): Ten months in the year during school term we run a compulsory night school. Every employee,

male or female, who can neither read nor write his own name, is compelled to attend this night school, where a working knowledge of English is taught, one hour each night, two nights a week.

Mr. J. A. Starkweather (Board of Education, Duluth): In cities where you have a public night school, you can furnish the teachers of the night school the safety signs that you want them to learn to read. That is one of the first things that we try to teach—the safety signs, the street car signs, and the few words that they need to read those signs. We wrote our own text-books, and that was one of the first things we put in them. The men in industry can help a great deal by furnishing to the schools those particular signs which they want their people to learn regarding safety.

WELCOMING THE NEW MAN

Mr. E. G. Quesnel (Commonwealth Steel Co., Granite City, Ill.): Very recently we adopted the plan of having our safety inspector take the names of new employees, which he turns over to the safety department the next day, and he goes down into the plant, looks these men up, shakes hands with them, tells them he is glad to see them, asks whether they like their job, whether they know where the wash-room is, where the safety department and the doctor's office are, pats them on the back and tells them if there is anything the matter to come to the office up near the gate and they will be glad to go into the matter. We have found in a good many cases this has proven extremely beneficial. Some of the men tell us that they never had a man give them two welcomes. They get one when they come in and the next day a fellow comes around, looks them up and shakes hands again. We believe also in teaching a man English. We have no signs nor publications generally distributed about the plant in foreign languages except three, one at the front gate which has all the languages on it—a sign of a safety first nature; one in the medical department giving a few rules that he is expected to know; and the fire sign which is in the building where there is danger of fire. All other publications are in English. Our plant publication is in English. We also have our school where we teach English.

Mr. H. S. Moody (Bausch & Lomb Optical Co., Rochester): We make American citizens out of all the men and teach them English at the same time. During the winter months we teach them all English. That saves putting up all signs in twenty-six different languages.

Mr. C. Sankey (Carnegie Steel Co.): Between the director of safety and the safety committee and the employee is the safety inspector. He is the pulse of the safety department, he is the one who should direct and influence the situation. No man should be a safety inspector unless he has that employee at heart and not the company.

In our plant ten years ago we had 1,700 men; we had 263 lost time accidents. Today we have 3,200 men on the pay roll and when I left home last Sunday we only had fourteen accidents and the worst was a broken place on the foot made by a casting thrown by another man. I

gave a report here that showed how one department had gone three years and six months with an average of 235 men without a lost time accident. That is safety. Remember that wasn't done by one man; that was done by each and every employee in that mill. Ninety-eight per cent of the men who work in our plant are safety men.

Mr. A. Kroes (Employers Mutual Liability Ins. Co. of Wisconsin): In one of the plants where I am, any non-English speaking man who comes in is given a folder. On it are four columns, one in his own language, translated into English. They contain the principles and points of safety to be observed in the plant. Then he is given this book to take home and read. After four weeks that man goes through an examination. If he knows what is in that little book and can intelligently tell what these safety principles are, he is given a safety button.

That creates a sense of competition, and the fellow who hasn't got a button is looked upon as a smaller man than the fellow who has got one. The fellow without a button is not in the class with the fellow who has one.

INSTRUCTION BY EMPLOYMENT SUPERVISOR

Mr. William Pellenz (Oliver Iron Mining Co., Eveleth, Minn.): The new man gets his first education in safety from the employment supervisor in our mines. He is told in a general way the nature of the work he is to follow and the hazards connected with it. If he cannot understand English, and 98 per cent of our employees do, an interpreter is called in to explain it to him. He is given a printed slip upon which is this slogan, "Remember, while you are hired to do some particular kind of work, the safety of yourself and your fellow workmen is more important than that work." This is also explained to him and he is given a card upon which is printed or written, "I have been instructed by (blank) regarding the duties and hazards incident to the occupation," and this is signed after it has been filled out by the straw boss under whom he works, and it is returned to the supervisor's office as evidence that this man has been instructed in the hazards of the occupation.

A year ago when we looked into the reason for the number of accidents, we were told that many of these injuries were preventable, that it was largely with ourselves as operators that they were caused, that we were not getting the co-operation of the men, and the reason we were not getting the co-operation of the men was because we were not sincere ourselves.

We have safety inspectors, and the men on the committees were picked from the men who could best be spared from the operations.

Our problem was to show the men we were sincere, and to show that we put on the committee the most experienced men we had. We now have an open pit foreman, a general underground man, a master mechanic, in conjunction with the safety engineer and the casualty man and the superintendent acting as the chairman. This committee makes a supreme effort to be present each month at all inspection trips, and every place in the district is seen at least once every month.

Our motion picture campaign, our monthly slogan card, all the educational work we have done and our successful efforts in getting the injured man back on his job or some other job without loss of time have been wonderful helps, but without the co-operation we are getting from the men, which we do get when they see that we are sincere, we would not have been able to accomplish the results we have accomplished in the past year. In the first six months of 1922 we had 2,166 days lost on account of accidental injury. With 1,800 men employed for a like period in 1923 we had 25 days lost for accidental injury.

Mr. Frank D. Elwell (Dayton Engineering Laboratories Co., Dayton): The safety man who overlooks the foreman is overlooking his biggest asset. The inspector who goes by the foreman and goes directly to the men is overlooking something big or he is following the line of least resistance because he is passing up selling the foreman. Many foremen are old school, hard-fisted fellows that have risen to their rank because they were hard-boiled on production. If the safety man goes out and sells the hard boiled eggs he has accomplished his biggest task and he has support.

Mr. A. M. Heederik (National Brake & Electric Co.): In putting the message across to the new man, and especially the foreigner, no matter how many schools or foremen or how much publicity you have got, it is not going to amount to a row of pins unless you get right down and try to understand the men, get down to the human element. If we can place ourselves on the same level with the man that we are taking into the shop, then and then only are we going to put the safety message across, and it is going to be a comparatively simple job if we do that. That is what I have learned at this convention.

FOREIGNERS ARE NEWCOMERS

Mr. Roy S. Bonsib (Standard Oil Co., N. J., New York City): I don't like that word "foreigner" at all. In the first place there is something repulsive about it. I like the word "new-comer" better. I think the big mistake that the average safety man makes in dealing with the newcomers is the fact that he fails to recognize that the men are newcomers, that they are not familiar with the peculiar customs of the country, also that the average class of men that are in our common labor ranks don't think as quickly as we do. Consequently when a thing is explained to them they will say they understand it because they don't want to appear stupid. In getting safety across the safety man should be sure that the new-comer really understands what is being told him.

It is very important that you get down to the personal element. The man is lonesome; he has been used to being treated with contempt, to being called a "damned Dago" or "Hunk" or some such name. Make a friend of that man, go to his christenings, his funerals, his weddings.

Mr. J. A. Northwood (Bethlehem Steel Corporation, Cambria Plant, Johnstown, Pa.): Our experience in accidents has not been with the non-English speaking men as much as it has been with the touring laborer, the fellow who comes in and stays for a week or two and then

gets the bug to move on. In looking over a number of our accidents in the past five or six months, I find that our trouble has been more with the man of that type than it has been with the non-English speaking man, and the trouble also has been more with the colored man. Sixteen per cent of the accidents that we had in the last four or five months were to colored men, with less than seven per cent of colored men working in our plant.

Chairman Forster: We are going to have at this stage the playlet which the Carnegie boys have prepared for us. After that is over, Major Reninger is going to take the chair and conduct a discussion of the second part of the program, namely, "Getting safety across to the men working in scattered small groups."

Mr. John A. Oartel: This playlet is based on a problem which arose because we have trouble with the non-English speaking man. We put on a course of lectures for foremen at the Edgar Thompson Plant that was so popular they asked us down to put on something for the employees. We knew that a large percentage of our employees were foreigners who wouldn't understand a lecture or get the message, so we decided to take dangerous practices that occur in steel mills and dramatize them for the men. Eight departments of the steel mill each put on a little sketch or playlet. This sketch is entitled "A Scene in a Foundry," and these men whom we have here are from our Edgar Thompson Foundry at Braddock, Pennsylvania. They consist of David Scott, assistant superintendent of the foundry; John O'Donovan, foreman, who has worked for our company for 43 years; Harry Owen, safety man; Edward Coles, Henry Maddern, Thomas Burke, James Elliott, Robert Toddler, Charles Taylor, molders, and Charles Walburg, new man. They will do things here like they do them in our foundry.

A SCENE IN A FOUNDRY

SAFETY PLAYLET GIVEN BY WORKMEN FROM FOUNDRY DEPARTMENT, EDGAR THOMSON WORKS, CARNEGIE STEEL COMPANY.

SCENE—Any present day in the foundry.

CHARACTERS—Foreman, John O'Donovan, seven present workmen and one new man.

PROPERTIES—Two medium flasks (complete), clamps, wedges, horses, patterns, moulders' tools, rammers, trowels, shovels, one tool box (small for new man), safety signs, water fountain, two shanks (complete), skimmers, red fire, sparklers, goggles, etc.

Curtain rises with stage set to represent a present day foundry, with piles of sand, copes and drags in place, faked up to look almost complete. There are two gangs working on separate floors, composed of Edward Coles, Henry Mattern, and Thomas Burke, and David Scott, James Elliott, Robert Taubler, Charles Taylor, with Charles Walberg, a new man. Harry Owens, Safety Man.

Coles and his gang look sullen and out of sorts because there are only three men in the gang, while the other gang is complete.

COLES—(Setting hammer down with a bang): "Say fellows, don't you think we are getting a raw deal out of this today. The boss wants us three fellows to finish this job in time for early iron. Now look at those fellows over there. (Points to other gang doing the same kind of work.) They have practically the same job we have and there are four of them to do it. I don't think we are getting a square deal out of this, do you?"

OTHER TWO WORKMEN—"No, we don't."

MATTERN: "Oh well, fellows, you know John has a big cast on today over on the other side of the shop, and he is a little short handed, now let's dig in and help him out. Maybe he will send someone over to help us out after a while."

"Say fellows, did you ever see an 'old-timer' like John take up with a new system like he has to this Safety First movement that the company has instituted. I would imagine an 'old timer' like him who worked under the old conditions would not be so strong for anything new, but he sure is strong for it."

TOM BURKE: "Hey fellows, here comes the boss, and he has a fellow with him who looks like a new hand."

COLES: "Hope he is, for we will need some help to finish in time for early iron."

(Enter foreman, with stranger.)

FOREMAN: "Well, fellows, here is a new man to help you out today. You were short handed when you started, but the office sent us a man. You can now get ready for early iron. I have given him a locker in the comfort room and told him of our Safety Plan in a general way. I would have liked to have gone into it further, but I am very busy. You fellows show him and tell him as much as possible today and I will have a better chance before long."

COLES: "All right, John, we will look after him." (To the new man.) "Well pardner, what might be your handle?"

NEW MAN: "Jim."

COLES: "Jim, what?"

NEW MAN: "Sometimes known as 'Sunny' Jim, sometimes 'carefree' Jim, sometimes 'careless' Jim, but mostly 'rhyming' Jim."

COLES: "Why the rhyming?"

NEW MAN: "Because I have the knack of making up verses of rhyme on most anything which interests me. Now this Safety Business the boss was talking about, I'll bet you, that before the day is out I can have a few verses of rhyme ready that will make you think some."

COLES: "Well, we will take your word for it, but we have a stiff day's work ahead of us here and we must be ready for early iron, so keep your verses until we have time to hear them."

COLES: "Come on, you fellows over there, we are on even terms, now that we have another man. Have any of you fellows over there nodding toward the other gang) any good stories to spout. If you have, let us hear them and it will give us a chance to catch up with you."

TAUBLER: "Yes, I have one about a big Safety First Fellow. How would you like to hear it."

ALL OR ANYONE: "Let'r go." (When ready, Coles signals for the crane. Burke shouts at the craneman, the hook lowers, and the lifting chains with four hooks are put on. Each man takes one hook. The new man makes the wrong hitch on the flask. The foreman enters in time to see it and halts the crane. He shows the new man how to hook up properly and gives a short talk on the same. He returns to Walberg and the others.)

FOREMAN: "I thought I told you fellows to look after this man. I was too busy at the time he came to instruct him properly but this is just another lesson for me along with a long line of others, not to be too busy to take time to instruct the new man in safety when he starts. Now, boys, I'm not bawling you out, but it is my way of showing you just what your safety is to the company, to our superintendent and to myself and, last but not least, to yourselves. No hard feelings, boys."

COLES: "That's all right, John, we know how you feel about it and we feel we are safe in your hands, but say, John, this new man says he is something of a rhymier. I wonder if he could rhyme us something on Safety."

FOREMAN: (To new man) "How about that, pardner."

NEW MAN: "Well, Boss, I guess I can have something before the day is out."

FOREMAN: "Well, go ahead, and if we have time before the iron is ready at the cupola, we will listen to what you have." (Exit).

(Here the lift is made of the cope to the horses and the men proceed to finish the mould. Walberg cautions the men to be careful. The gang takes the cope from the horses and replaces it on the drag. They clamp up and are ready for the iron.)

FOREMAN AND SAFETY MAN ENTER: (Safety man rushes on the stage with an accident blank and a bunch of letters in his pocket in regard to delayed treatment cases. Reads accident report in very excited manner.)

SAFETY MAN: "John Gordon, Check 43125, injured Sept. 30, 1923, at 4.00 P. M., reported Oct. 1, at 8.00 A. M. Scale in eye."

"Now, John, almost every one of our delayed treatment cases happens just at quitting time and the man will not go to the hospital on his own time. We are in bad with the manager. (Pulls bunch of letters from his pocket and reads them.) "What are we going to do about it. I have talked and talked, have done it so much that they have nicknamed me 'Delayed Treatment'."

FOREMAN: "Well, suppose I fire the next man who does not report?"

SAFETY MAN: "Oh, no. Firing a man is the easiest job a foreman has. Aynbody can fire a man. The ideal foreman is the man who can make his men obey orders."

FOREMAN: (Turns to workmen) "Now, boys, see the trouble you have gotten me into. Trouble for your Safety man. Trouble for your superintendent. Bad record for your department and in every delayed treatment case there is a big chance for infection. We simply must do better. I cannot watch you all the time. I have other work to do. I can only oversee you in a general way. But you know when you get hurt and just because it is quitting time is no reason why you should not go up to the hospital. Why, I remember the time when a workman had to go to his own doctor after working hours and had to pay the bill himself. Now, all treatment is free and some of you feel that you should be paid for going to get free treatment. Boys, you must get away from that notion. Now, I pray you, watch yourself and watch your partner. Let's go."

SAFETY MAN: "That's a fine talk, John. I feel sure 1924 will be better than 1923. (Safety man exits.)

FOREMAN: "Well boys, I see you are ready for iron but it will be a few minutes yet before the cupola man is ready."

COLES: "Yes, John, we are ready in good time. Now, how about this new man giving us some verses on Safety. He seems to have the stuff all right."

FOREMAN: (To new man) "How about it pardner, let us see what you have, you seem to have made a hit here and if you have anything worth while on Safety, you can rest assured you can make good here."

NEW MAN: "Well, fellows, I have been looking around a whole lot today and I must say I like this place. It is the best equipped shop I have ever been in and I know I am going to like it, and I hope I make good. I would like to stay here because I see you are all interested in each other's welfare and safety, and gee, you sure do take care of your workmen here. Why, I worked places where you did not have anywhere to put your tools, your lunch or your clothes. Why here you have clothes lockers, tool lockers, wash bowls, shower baths, drinking fountains and toilets in a fine big building set apart for them and you furnish all safe tools to work with and safety guards all around pouring pits and cupola pit and screened away from the chipping floor and goggles to wear when you are casting. Say, some of you fellows better pinch me or I will wake up and find

I have been asleep and dreaming I was in Moulder's Heaven, and say, they tell me there are quite a few fellows here who don't take advantage of these comforts that are supplied them. Say, they must be boobs or they don't have very much feeling for their people at home or they would wash and bathe and change from their dirty shop clothes to ones better to come and go from work in. Well, Boss, I have thought up some verses on this Safety and with your permission I will give them to you and the boys. How about it, have we time?

FOREMAN: "Yes, go ahead."

NEW MAN: "This I will call 'How I Learned About Safety From Them'."

"I have taken my jobs where I found them,
I've roamed and I've bummed in my time;
I've had good luck in getting partners,
And four of the lot were prime.
One was a first class moulder,
Another a gold miner from Nome,
One was a grand old machinist named Harry,
The last a young laddie from home.

"Now I weren't much for this Safety,
But taking it all along,
It's got me a-guessing, this Safety.
And surely it cannot be wrong.
There's times when you'll think it mightn't be right,
And there's times when you think it's all wrong.
But the lessons I've learned from the crippled and burned
Make me think that it's good for the strong.

"Now I was a young cub in those days
A-learning my trade on the floor.
French Johnny was working beside me
When the crane broke as never before.
That big flask came down with a wallop,
Poor Johnny was under the rim.
Why, it happened so quick it near made me sick,
But I learned about Safety from him.

"Then I quit the trade for the Yukon,
Went a-diggin' for gold in the ice,
Met there a husky young miner
Who sure was in need of advice.
He was brawny, and lucky, and boastful,
This reckless young heathen named Tim.
Well, he's there to this day, but deep buried in clay—
And I learned about Safety from him.

"Then I shifted from there to Portland,
Got me a job building ships,
They put me to helping a machinist,
Who wasn't afraid of hot chips.
Till straight in the eye he got one,
Red hot from the tool to his glim,
So now he is shy that useful right eye—
And I heard about Safety from him.

"Then I came home to the Old State,
Thinking I'd learned a good rule,
Until this young laddie running the drill press
Showed me I was a damn fool.
He wore a loose jumper, the ninny,
The fast turning spindle caught him,
Broke his arm with a snap like a dynamite cap,
And I learned about Safety from him.

"So I've taken my jobs where I found them,
But now that I'm roaming no more,
I've brought home to you this good message,
It's yours—clear down to the core.
That Safety that you figured for others
Comes home to you now, can't you see?
Be advised by my lot, which I think that you caught
And learn about Safety from me."

FOREMAN: (To the new man). "Well, pardner, you sure have the right idea, and if you put into practice what you have just put into verse, there is no doubt in the world that you or any other fellow who comes along or is already here will make good with the company. Oh, here comes the iron, boys, so get ready and we will pour off and try and make this another safe day. Put on your goggles and keep your heads away from the gates."

MEN: (In unison) "We are with you, John, for Safety First, Last and Always. Three cheers for Safety, Boys."

(Pour iron.) Four men retire to the wings and come in with a shank of iron in which red fire is burning. Around the edge of it are sparklers fastened to be lit on entering to depict iron sparkling in the pots. Two or three skimmers are equipped with sparklers also. While four men are carrying the shank, equipped with goggles, one man gets skimmer from its place. He has no goggles on. He is just in the act of putting the skimmer over the ladle pot when the foreman calls his attention to not having goggles on.

FOREMAN: "Say, what do you mean by attempting to skim without your goggles on? You have been here long enough to know that it is a dangerous practice."

MATTERN: "Yes, it sure is and I can verify it also. See." (Here Mattern shows the workmen and the audience his glass eye, saying) "If I had practiced all the things which we now have, I would not need to be wearing this in my head. I would have two good ones instead of only one. Play safe, old boy, or suffer as I did, and am."

(Then Thomas Burke tells how his goggles saved his eyes.)

(Finish pouring iron.)

FOREMAN: "Well, boys, we have come through another day safely and we should all be thankful."

MEN IN UNISON: "We are, John. Good night."

CURTAIN

Chairman Reninger: Mr. Oartel, I want to thank you and the men of the Edgar Thomson Works for bringing to Buffalo and the National Safety Congress a lesson that has been worth all the trouble and expense, and I think the demonstration that you have given all of us here we can carry back home to the shops and factories and impress upon our men.

MEN WORKING IN SCATTERED SMALL GROUPS

Mr. Northwood: We are handling the small group through the foreman and by appointing one man of the departmental committee to represent every definite hazard that comes into his area. We are getting big results by having a man that will represent every hazard that the men come in contact with.

Mr. F. L. Wanzer (Steel Co. of Canada): It has been our problem, as it has been the problem of most of you, as to how to reach the men and to sell them this idea of safety. We are using the foreman; we want to try to make the best of the foreman, so we get an order from our works manager to the effect that the foreman or his sub-foreman shall appoint one or two or three of his men. You make it very simple to start with so as not to overburden them. We say, "You must come and report every day something that you have seen. If you have seen something that is in the way of a near accident, so much the better.

The man has to hunt around and find something different to report to his foreman every day, and he has exercised the ability of observation; he has also improved his memory; he has had to think of what he has seen. His foreman has a form which is sent to the superintendent. The superintendent's office sends it to the works manager's office, the works manager's office sends it to the safety office, and that is where it is hooked up. If he has a little message, an accident, a steer for the superintendent, he puts that on the report. These reports come in daily, are looked after and classified under the twelve departments into which we have divided our works, and at the end of the month these are all summed up and a general report made upon them. We get after those that have not reported or that have reported intermittently. Those that do report or are reporting something worth while get a letter of recognition immediately acknowledging the report and helping them along, showing that we are with them, that we are trying to help them, take notice of what they say, and are really interested.

Mrs. Ruth G. Thompson (Northern States Power Co., Minneapolis): In a power company we have underground and overhead, utility and construction groups. These men are scattered all over our city and many times in distant places. They rarely get to the central plant, and it is very difficult to reach them with these things. Furthermore, in my experience I find men talk very much better and you get much closer to them when you talk to them on the job; they can smoke their cigars and sit down and be perfectly happy. I took a man out with me all this summer talking to men on the job. It is all done on company time, and when we have finished presenting things to the men, they in turn present their problems to us and we take up their criticisms with the general safety committee. Those criticisms are answered and sent back to the men.

Mr. E. S. Chapin (Safety Inspector, Pennsylvania Railroad, Philadelphia): I think that probably the railroad has scattered groups as far afield as any other line of work, and I might throw this hint to you which is a method being used on at least one of our divisions rather experimentally at present, but probably will be extended. We have our safety committees. The chairman of this particular division safety committee conceived the idea of having one-twelfth of the supervisory forces attend the safety committee meetings each month, so that in the course of a year the entire supervisory force of that division gets to one

safety meeting at least. The size of the division is such that these supervisory forces make a meeting of about seventy men by themselves. There are something over 15,000 employees on a division.

THE QUARTERLY SAFETY WEEK

Mr. R. A. Shaw (Ford Motor Company, Detroit): Almost everybody here has individual safety drives and things of that sort. We have adopted a quarterly safety week whereby the different foremen of each department must give their own material and conduct their own safety week. We give assistance in any way possible. That seems to carry to every division of the plant, and the foreman is placed on his own initiative, and it is surprising how much a man will get if he seeks it himself. The first week of each quarter is safety week, and it is really surprising to see how the accidents drop in that week. I just speak of that because I believe it is a little bit new. The new point is in placing responsibility on each department. I believe you might take that to men out in groups. I notice in Detroit one of the telephone companies put a badge on a certain group which indicated that that group were leaders in the safety drive at that particular time. Outsiders notice that and it draws their attention.

Mr. D. J. Wallace (Humble Oil & Refining Co.): We have scattered groups. In order to go out and get the oil that we are using we have got to stick holes in the wildcat territory, and that means about five men go by themselves. We have established in the minds of our foremen the fact that their accident experience may either jeopardize or help very greatly in their advancement. When a foreman or a gang pusher, as we call him, goes out with a crew of five men to put down a hole, he carries that thought with him, that if he has a good accident record it will help him wonderfully; if he does not, it is a black eye, because he only has five men to handle and any man ought to be able to take care of five men.

Mr. J. M. Steffen (Standard Oil Co. of Kansas): We should not overlook the average man in the ranks. The more we can get next to him the better results we will get.

Mr. Bonsib: Getting safety across to the sales department of an oil company is very difficult because you have groups ranging from three to twenty men. I have recently completed an 11,000 mile trip lasting four and a half months in order to reach the small groups. I have found through years of experience that what a man sees makes more impression than what he hears, and I have made a practice of carrying a kodak with me. In fact, I wouldn't think of going without a kodak because it saves an awful lot of argument. I catch men doing things that they shouldn't do, and sometimes I catch men doing things that are correct. I find conditions that are good and conditions that are bad. I have slides made of those; then when we get the men together we show them these things. I am also a great believer, as most of you know, in the family element, because although we men don't like to admit it, we usually do what our folks want us to do. We have little meetings in the garages, in the ware-

houses, out in the open, in churches and schools, with probably only six or eight or nine or ten, but we get the men and their families together and show them the slides of the father, the husband, the brother, doing things that he should not do. It tickles the man to death to see his picture on the screen, and it makes a deep impression. When you catch a man doing something wrong, he says to himself, "Well, that guy won't catch me doing that again." It is also an example to others.

You can carry a little portable machine and work it on any lighting circuit. Most of our oil companies have lighting systems in their plants.

Another very good plan is a personal letter. Occasionally we hear of a man getting hurt, and we write him a letter. We do that not only in the sales department but also in the producing department, which is another place where we have large numbers of small scattered groups. That has a very splendid effect.

THE FOREMAN'S INFLUENCE

Mr. Leo D. Woedtke (Fred T. Ley & Co., Springfield, Mass.): Our labor is continually fluctuating. You may find 100 men on a job today and 350 a week later, or perhaps only 10, according to the progress of the work. I had one striking illustration that I will give you briefly to show you some of the unique ways that these so-called rough-neck, hard-boiled foremen on a construction job well develop out of their own minds something about eighteen jumps ahead of the educated safety director or engineer. By the way, this superintendent was with us about ten years and is with us now. This thing happened about two and a half years ago. This chap was sure enough hard-boiled. He was so bad that we found one of his hoist engineers sleeping alongside of his engines, the safety valve plugged and the boiler about to burst. We also found four sticks of dynamite in a tool box with small tools being jostled about. We got under his skin one day; I don't know whether it was in his head or heart or where he sat down, but we got him. He felt pretty cheap about it and he decided he would issue a bulletin of his own, and it was a bird; I have never seen anything like it. He had run it off in blue pencil, and then he went into the mill and had it typewritten and put on one of our letter-heads. It came out one time on the inside cover of the *National Safety News*. It read something like this:

"To the Men on the Job: Of course we have always considered this white collar stiff back in the home office crazy. Sure he's crazy with all this safety stuff, but we have come to the conclusion that we might as well do this job clean and without bloodshed as to do it the way we are. We are making jobs for the undertaker, and that is all going to stop. From now on every man on this job has got to account to me if he gets hurt and why he gets hurt. Furthermore, if it is up to me I will take the blame; if it is not, he will take the blame. The first time he gets hurt through any fault of his own beyond what he can control, he is fired."

I couldn't get that over in twenty years. Nothing I ~~could do or say~~ would permit such a statement as that going up on a ~~hand-made~~ bulletin board, but when the big boss on the job puts it over, it goes through.

Mr. George Stark (Elyria Iron & Steel Co.): I think not enough stress is laid on the foreman. Let me tell you one experience I have had in the plant I am taking care of in safety work. I am afraid too many of us, with a lot of foreign element, are depending upon the interpreter the first crack out of the box. From actual experience three months ago, before we posted our bulletin on the number of accidents, the kinds of accidents and the number of men employed and the actual money spent, I made a round of the different departments, especially amongst the foreign element, and I had a heart-to-heart talk with those men in the good old American language. What did it mean? In less than six hours afterwards 70 per cent of those men had come to me and wanted me to explain in detail just what I was talking about relative to safety. Of course then I had to call in some of these different interpreters because I couldn't get the point clear to them when I took just a few minutes making those rounds.

Chairman Reninger: Reference has been made to the white collar man and his getting out on the job. I think if all of us here, especially those of us who are supervisors of safety in various organizations can persuade the officials of our companies, the president or the vice-president in charge of operation, or whoever may be the head of the organization, to come to a National Safety Congress and spend two or three days, it would be an easy job for you to put safety across to your organizations.

ADJOURNMENT.

Annual Banquet

October 4, 1923

JOHN D. WELLS, Toastmaster
Managing Editor, Buffalo Times

PRESIDENT DOW: You read in the papers the other day, perhaps, of the invitation that had been extended to the National Safety Council to send a representative to attend the International Labor Conference of the League of Nations at Geneva, Switzerland, in October. That invitation was accepted by your Executive Committee, and at its meeting this afternoon the Executive Committee appointed as your representative and ambassador to attend this Conference none other than our indefatigable and untiring Managing Director, William H. Cameron.

ANNOUNCEMENT OF NEW OFFICERS

The next item of business on the program is the announcement of the election of your Executive Committee by the Board of Directors for the ensuing year. I will read the list of names of these members of the Executive Committee:

C. B. Auel, East Pittsburgh.
C. E. Pettibone, Boston.
George T. Fonda, New York.
R. Dawson Hall, New York.
Robert T. Herdegen, Walkerville, Ont.
Homer E. Niecz, Chicago.
Herbert A. Rowe, New York.
Walter G. King, New York.
L. A. De Blois, Wilmington, Del.
Henry A. Reninger, Allentown, Pa.
Julian H. Harvey, Kansas City.
C. L. Hinkel, Chicago.
A. D. Risten, Hartford.
R. B. Stoeckel, Hartford, Conn.

I see here the names of Mr. Arthur H. Young and somebody else by the name of Dow as Past Presidents.

Representing the various sections we have also on the committee the chairman of the Public Safety Section, Mr. David Van Schaack, of Hartford; Mr. A. W. Whitney of New York, Chairman of the Education

section; Mr. James P. Barnes of Louisville, Chairman of the Electric Street Railway Section; Mr. F. P. Walker of Detroit, Chairman of the Ice and Refrigeration and Taxicab and Delivery Sections; Mr. A. L. Watson of Niagara Falls, Chairman of the Chemical Section; Mr. W. H. Moses of Boston, Chairman of the Public Utilities Section; and Mr. Fred Metcalfe of St. Paul, Chairman of the Steam Railroad Section.

We have also elected to serve on this committee one representative each from the St. Louis, Memphis, Milwaukee, Detroit, Rochester, Baltimore, and Massachusetts local councils.

Your Executive Committee at its meeting this afternoon elected the officers for the ensuing year. It gives me pleasure to announce as vice-presidents elected, Mr. C. B. Auel, of East Pittsburgh, Vice-President in charge of General Activities; as your Vice-President in charge of Local Councils, Mr. Georga T. Fonda, of New York; as your Vice-President in charge of Industrial Safety, Mr. H. A. Reninger, of Allentown, Pa.; as Vice-President in charge of Public Relations, Mr. David Van Schaack, of Hartford, Conn.; as Treasurer and Vice-President in charge of Finance, Mr. Homer E. Niesz.

For your President for the coming year your Executive Committee has very wisely selected a man who is a thinker, a man who has served as an officer in practically every office within the gift of this Council except the office of President, to which he has just been elected, a man who is a leader of men. Good leadership, we know, has been the secret of the success of great movements the world over from time immemorial. We are to congratulate ourselves that the Executive Committee of this organization has selected as your President for the coming year a real leader, a man who was President of the Delaware Local Council and who for the past year has rendered yeoman service as Vice-President in charge of Local Councils, Mr. Lewis De Blois.

ADDRESS OF ACCEPTANCE

LEWIS A. DE BLOIS

I wish to assure you that in accepting this great honor that your Executive Committee has bestowed upon me, I do so with a deep sense of the responsibility imposed by the high standard of devotion and accomplishment of our Past Presidents, and especially my predecessor, Marcus A. Dow. It is my privilege, and a great pleasure, to inform you that Mark Dow, although filling a position of grave responsibility in the Police Department of the City of New York, a position which unfortunately precluded his accepting nomination for reelection as President of this Council, has consented to serve as and has been duly elected Vice-President in charge of Public Safety.

The formulation and execution of the general policies of the Council is vested in your Executive Committee, but I trust that I may be permitted at this time to express an individual opinion on what branches of our work are deserving of special development during the coming year.

I believe, first, that we should intensify the activities of our industrial sections so that industrial accident prevention may be developed to a higher degree of efficiency. To this end I wish to take this opportunity of requesting the newly elected chairman of industrial sections, as many as expect to remain in Buffalo over night, to meet for breakfast with the officers at nine o'clock tomorrow morning in Room 1118 for a short preliminary conference on the year's work.

I believe, second, that we should press forward toward the solution of the public safety problem by stimulating greater public interest in the subject, especially among our industrial connections, by improving our sources of statistical information and by continuing our present policy of local council organization and development.

URGES CLOSER PUBLIC RELATIONS

Thirdly, I believe that the Council, through the offices of its new Vice-President in charge of Public Relations, should bring about closer relationship with the more important national trade associations, with all national bodies directly concerned with human conservation, and with the various departments of our federal government, so that the Council's scope and purpose may become better known and receive actual national acceptance.

We have many duties to assume and many obligations to fulfill before our goal of "Universal Safety" can be attained, but no year in the Council's history ever held for us more hopeful prospects than this.

Not this mere handful of earnest men that you see gathered about this table tonight, but you, you, my friends, are the National Safety Council, and we that are here want you to take home with you from this great and successful Congress not only a feeling of gratification over the success that you have so far obtained, but also a sense of individual moral obligation. To your safe keeping is entrusted the sacred gift of human life, your own life and the lives of many others. Take with you also the promise that your executive officers, for whom I may act as spokesman, will do their utmost to advance, develop and solidify the work of the National Safety Council.

President Dow: Of all the splendid achievements in life saving that have been brought about by organized safety work, to my mind there is none that is so magnificent, none so inspiring, none so beautiful in its appeal to the human heart as the fact that countless children have been saved from death or injury by safety methods, as the fact that in countless American homes the lives of young children have been permitted to go on and grow in healthy surroundings because by organized and consistent safety effort, a father has been saved from death or mutilation.

Who is there among us who has not been thrilled by that safety poster of the little child with outstretched arms, entitled, "The Best Safety Booster of All"? Who is there among us who has not been

thrilled by that other poster of the little child under the caption, "Ask Daddy"? I am sure that every one of you here will find a special appeal in these few lines of verse which I copied from a book I was reading just the other day:

"Your creditor, a child stands there,
A normal child with tossing hair,
With grimy hands and smudgy thumbs
And childly charm, save what the slums
Have robbed him of and left him wan
And thin with half his boyhood gone.

"Your creditor? Why, yes, by right
Of all the wealth and health and might
God gave you, for in your care
He placed the little urchin there,
And bade you hark to his distress
And help him in his helplessness.

"You owe him fields and pleasant ways,
The endless joys of boyhood days,
The streams, the paths, the skies more fair
Than he has dreamed, the country air,
The summer days with trees unfurled,
The good, good green of God's great world.

"You owe him all that you ever can
Help fashion him a manly man.
No common debt of such that is
Offset perchance by promises,
But one that stands forever. Go,
Go pay the debt to the child you owe."

The author of those lines of verse and of many other choice bits of poetry in that book, "The Rhymes of the Old Home Folks," sits at my left. It is needless for me to say that for years he has been well known and loved by the citizens of Buffalo. As the originator of the column "Grave to Gay" he has been quoted in newspapers throughout the United States. As the Managing Editor of the Buffalo Times, a newspaper that has given us wonderful cooperation this week during our Congress, he is a newspaper man of the highest rank. We would be honored, indeed, if he were here simply as our guest, but we are doubly honored in having him here not only as our guest but as the Toastmaster of the Annual Banquet of the Twelfth Annual Safety Congress.

TOASTMASTER'S ADDRESS

JOHN D. WELLS

Buffalo has been tremendously interested in your coming. Buffalo is deeply conscious of the bigness of your subject, Buffalo has followed the trend of your deliberations with an interest that is complimentary to you.

This for two reasons: First, Buffalo is proud to entertain so representative a body of people; secondly, Buffalo is a city that operates greatly along the lines that you are laying down, the conservation of life and health.

Curiously enough the Safety Movement came when it was most needed; perhaps that is destiny, perhaps that is the working out of the great inscrutable plan that none of us has ever been able to explain. With a world terribly torn and dismembered, the spectacle of earnest men and women trying to save the individual is a wholesome thing to look at.

Inconceivable as it may seem, your officers tell me that your efforts to conserve human life and health encounter both opposition and indifference. There are such people in the world, regrettably. Some people are upset by any attempt at a good and a human thing for their fellow-men.

Our first speaker tonight comes from the British Empire. He is one who has studied conservation of life and health from every conceivable standpoint. Ladies and gentlemen, I have great pleasure in presenting Sir Thomas Oliver.

SAFETY AND HEALTH IN INDUSTRY

SIR THOMAS OLIVER, NEWCASTLE-ON-THE-TYNE, ENGLAND.

I have always regarded safety as a movement of American origin, and in Great Britain, although we have followed, we have never yet overreached you; but in the matter of health in industry, that movement began in Great Britain and you have wisely followed.

I need hardly remind you that health in industry is a movement that only dates back thirty or forty years. At that time there was in England a considerable outcry against a number of deaths of people in the factories. In the town from which I come, Newcastle-on-the-Tyne, there were several deaths every year from lead poisoning, particularly amongst the young women, and also amongst the children of the workers in the lead factories. As a physician I felt that something ought to be done to put an end to that state of matters. I addressed a meeting of the British Association of Science when it came to Newcastle, and I pleaded for the workers' education.

Mr. Asquith, who was then Home Secretary, appointed a small committee and asked me if I would act upon it as medical expert, just, of course, the very thing I was only too anxious to do. As the result of that inquiry we were astonished to find that there were so many deaths and so much suffering and that there was such an enormous loss of infantile life to Great Britain.

The first thing I asked the Home Office to do was to remove the women from the dangerous processes of lead making and to institute machine methods for what had been done by hand. The result, with other regulations as well, was an extremely satisfactory condition of things.

When I was here eleven years ago, a lead manufacturer told me that he had 53 cases of lead poisoning in his works at that particular time. I was through these works only ten days ago, and I was told that there are never more than two cases now in the year. That is the improvement of industry by regulations and by the introduction of mechanical means.

ELIMINATION OF PHOSPHORUS POISONING

One other illustration as to what preventive medicine has done is this: Just about the same time that our country was scandalized by the number of deaths that had taken place in the industries, there came out in London the knowledge of the fact that in one large plant or match factory alone there had been six cases resulting in death from what is known as phosphorus necrosis of the jaw. It is a very painful condition of things, and when it attacks the upper jaw it is rapidly fatal. Mr. Asquith appointed Sir Edward Thorpe and myself to go into this matter, and the result was that I traveled through Belgium, Germany, Austria, Hungary, and also I had been to Norway and Sweden, to see how they were conducting conditions and work in the factories. I found the same amount of sickness there as we had at home. It was clear, therefore, that something ought to be done, not only for own country but for others. I found that France had taken up the matter as seriously as the British Government had, and that it was carrying out many experiments as to whether a substitute for white phosphorous could be found. They did find a substitute known as the sesquisulphid of phosphorus, which is a harmless material, and matches are now made out of that.

What is the result? At the time I speak of there were many cases of death, accidental in the case of children, by their sucking the red tips of matches, women dying and suffering great pain from taking a box of matches and putting them into a tumbler of water and allowing them to soak there, and as the result of either being crossed in love or through some difficulty in the home, after drinking this they became jaundiced and died from phosphorus poisoning.

As the result of the introduction of the sesquisulphid of phosphorus there will never be another case of phosphorus poisoning, suicidal, or accidental in industry.

I, as a medical man ought to cure and not to destroy, and I have always felt, therefore, that wherever I came in contact with a dangerous industry it was not for me to recommend the abolition of the industry itself, as sometimes has been suggested, but rather to find out how that industry could be cleared of the poison and bad conditions behind it. I have maintained and always felt that a man's occupation should never be a cause of suffering or death.

It is many years since factory legislation began in England in regard to the hours of work that children and women should have, and we have, I think, rather satisfactory hours so far as our own country is concerned, and you, I think, have done the same.

Eleven years ago, as I have told you, I came to this country and visited several of the factories. You were just beginning to wake up then; you had been a few years awake, I admit, but you were beginning to take a keener interest than ever in the matter of improving your industries. Whatever you Americans take up you carry on with greater vigor and you carry on with better organization than we do, and the result is that you get really ahead of us. We don't begrudge you that position at all. As a nation you are alert and enthusiastic and you reach your points generally quicker than we do. We in our country are slower, we take life more leisurely and I think sometimes we really get more out of it, although I admit you put more into it.

UNEMPLOYMENT AS OCCUPATIONAL DISEASE

I am sometimes asked about occupational diseases. My name has been associated with that, for some reason or another, and I think sometimes the greatest disease of occupation is to have no occupation at all. I mean that seriously, because in my own country at the present time we have not recovered from the effects of the war. There is still unrest. You may have your labor troubles here as every country has in its time, but you have nothing like the unemployment we have in our country. One million two hundred thousand people are still unemployed, and the government has spent 65 million pounds in trying to relieve the unemployment.

I have been pretty well through the States this time. I have been down as far as New Orleans, up through St. Louis, Chicago, Detroit, Cleveland, and I am now making my way to Boston to attend a meeting next week, and I cannot but admit how struck I have been by the air of prosperity which is present all through the states that I have visited. You are a prosperous people, you have much to be proud of, you have a territory that we all might envy, and you have, as a result of this, new industrial opportunities lying before you which I feel you will tackle as well as the problems coincident therewith and you will surmount them in the future as you have done in the past.

A HUMAN TOUCH

JACK ARMOUR, MCGRAW-HILL PUBLISHING COMPANY, NEW YORK

On an occasion of this kind in New York at the Astor Hotel about two weeks ago, with not so many people present, the toastmaster had introduced the first speaker when it came to the coffee. He had been on his feet about three minutes when one of the prominent members went to another and said, "Bill, would you chip in \$5 to kill that after-dinner speaker?"

"Yes, Bob, here's twenty-five dollars, kill five of them."

I was at the Hotel Blackstone in Chicago with 750 people in the audience and 20 people to speak, and when they introduced me I looked at my watch and it was twenty minutes of two in the morning. I had been talking 15 minutes when I had the temerity to look at the audience,

and behold, the dining room was empty, saving one poor devil who sat on my left, and I said to him, "My friend, I don't know your name, but I have been no good to my business, I have been no good to my home for the past three months; I have spent most of that time in libraries digging and researching to make this one grand speech, and I'm going to finish it even if you are the only listener."

He said, "Go on, old man, don't mind me, I'm the last speaker."

I hope what little I have got to say won't be received as that political address was in Pittsburgh during the last campaign when this wonderful orator wound up with "I want rent reform, I want political reform," and then with both fists up he said, "I want house reform," and a fellow yelled out and said, "Yes, and you want chloroform."

I propose that my speech will be like a woman's dress, short enough to be attractive and long enough to cover the subject.

I was in Philadelphia last Thursday night; I spent a week there that night; you can do that in Philadelphia. I had my feet under the sumptuous table of the Bellevue-Stratford Hotel and I was requested to give a toast. Think of it! A toast in these times when the house is filled with old women of both sexes and when the roll is called they don't know whether to say "Present" or "Not guilty." I gave a toast; it is short: Here's to America, the land of a billion bushels of wheat, the corn-fed country, America the greatest garden in all God's earthly empire, the land where they pay more and play more, the land with the best money, the highest ideals and the most human humans, America, thank God my home! And the fellow said, "No, no, not that kind of a toast, a regular toast." Then I raised my glass with what was in it and I said, "God dress our women. we can't." When I got through with that toast I found my right hand clasped around a shell glass of near-beer. I said, "Why, it's a sacrifice to have made such a beautiful toast on such material."

It put me in mind of a sign I once saw flashed in a movie house, "The man that invented near-beer was a very poor judge of distance." Near-beer makes me think of a corpse: the body is there but the spirit hath departed.

You won't believe this, folks, but seated on my right hand at that table was a fellow from Boston where the breaking waves dashed high on that stern and rockbound coast, where they dumped the tea into the harbor. The iron cross is still there in the center of the city where the riots occurred; the church is still there where they hung the lantern in Paul Revere's ride. He was a regular Yankee; when he discovered that that old cocktail he was so used to wasn't forthcoming, he turned to me and said, "Judge, it's a shame that the Plymouth Rock didn't land on the Pilgrims."

Speaking of Pilgrims, at Valley Forge Washington said, "Put none but Americans on guard tonight." That is what history states, but, ladies and gentlemen, what Washington really said was this, "Put none but Americans on guard tonight; let the Irishmen sleep; there's fighting to do in the morning."

When the cry came for volunteers, one of the first to enter was my friend Mike Maguire. Nine months after that—front trenches, a half hour before zero, all ready to go over the top. The commanding officer reviewing the troop came up to my friend and said, "What's your name?"

"Private Maguire," he answered.

"Where's your hat and coat?"

"Oh, I forgot them. I'll be here in a minute, sir, with the hat and coat."

"But where's your gun?"

"Oh, I forgot that too. I'll be here in a minute with the gun."

"Where are your cartridges and your belt?"

"Oh, I forgot them too. I'll get them right away."

"Say, what were you before you went to the army?"

"I was a plumber's helper, sir."

Your good Toastmaster nudges me and says, "Say something about safety." I suppose I ought to. I have a friend in New Hampshire, Cyrus Young—Young by name but married in middle life. He was about 49 years of age when he got married, and he married a widow. He had a nice home all ready for him to walk in and hang up his hat. In the parlor of that abode on the mantle shelf was an urn that contained the ashes of her first husband who had been cremated. One day about three months after he had been married he came home after it had been raining all day and freezing as the rain fell. The sidewalks were very dangerous. When he neared the house he saw his wife standing on the stoop, the urn in her hand, and she was sprinkling her first husband's ashes on the stoop to make it safe for the second husband to come up.

If there is one thing in this world that I like to do it is to spread sunshine. I love to see a laugh. Here's a short poem I have time to give you:

"A laugh is just like sunshine.
It freshens all the day,
It tips the peaks of life with light
And drives the clouds away.
The soul grows glad that hears it
And feels its courage strong.
A laugh is just like sunshine
For cheering folks along.

"A laugh is just like music.
It lingers in the heart,
And where its melody is heard
The ills of life depart.
Happy thoughts come crowding
Its cheerful notes to greet.
A laugh is just like music
For making living sweet."

The great philosophers tell us there is no tomorrow. Good people I have made up my mind long ago, so you make up yours tonight whenever you get an opportunity to let your face slip into a wrinkle of laughter, let her go. Don't stop a laugh; you don't know when the next one is coming.

I want to leave one more little verse with you by James Whitcomb Riley:

"When a man ain't got a penny
And he's feelin' kind of blue,
When the clouds hang dark and heavy
And won't let the sunshine through,
It's a great thing, oh my brothers,
Just to have a fellow lay
His hand upon your shoulder
In a friendly sort of way.

"It makes a man feel curious like.
It makes the tear-drops start.
And you feel a kind of flutterin'
In the region of your heart.
You can't look up and meet his eye.
You don't know what to say.
When a fellow's hand rests on your shoulder
In a friendly sort of way.

"This world's a curious compound
With its honey and its gall,
With its cares and bitter sorrows,
But a good world after all.
And a good God must have made it,
Leastways that's what I say,
When a fellow's hand rests on my shoulder
In a friendly sort of way."

A short address was made by the Hon. Forbes Godfrey, M.D., Minister of Public Health and Labor, Toronto, Canada. He eulogized the efforts of the Congress delegates in public safety work and declared that the wholesome effect would be felt throughout Canada.

ADJOURNMENT.

AUTOMOTIVE SECTION

October 2-3, 1923

E. F. BLANK, Chairman

Safety Director, General Motors Corporation, Detroit, Mich.

THEODORE O. MEISNER, Vice-Chairman

District Safety Manager, American Can Company, Maywood, Ill.

L. E. AVERILL, Secretary

Safety Engineer, Oakland Motor Car Company, Pontiac, Mich.

TUESDAY MORNING SESSION

CHAIRMAN BLANK: We have had fifty-three new members added to our Automotive Section during the last year. We started out right after the last Congress on a memberssip campaign and through the National Automobile Chamber of Commerce we solicited all the automobile manufacturers.

The Automotive Section work comprises anything from metal working through the foundry to wood working, so a cross section of our work overlaps and covers some of the other sections.

I want to report for the statistical committee, of which Mr. J. R. Anderson, Continental Motors, is chairman, that we sent out 240 letters asking members of the Automotive Section and allied industries to cooperate in reporting accident statistics on the standard basis. We were able to get 25 to report in that way, which report was given, I believe, in the May issue of the *National Safety News*. Ten of the automobile group and fifteen of the motor and accessory group reported on the standard basis. We hope next year we can get more of the manufacturers to report on this standard basis, so we can get some idea of comparative figures.

The bulletin committee, of which Mr. W. F. Sterne of the American Radiator in Buffalo is chairman, reported a good many bulletins sent to the National Council and a lot of material sent in and worked up.

I have talked to several men who have an idea that the Engineering Section is made up of a bunch of "high-brow" graduates who get together and discuss some of the things that ordinary men can't talk about, in mechanical terms. That is wrong. The Engineering Section is a cooperative section of the National Council and is spending a great deal of time on engineering problems and new engineering projects, discussing these matters and drawing up codes. They have held three

sectional meetings this year, one in Chicago, one in Detroit, and one in New York. At least five of these sectional meetings are planned for next year. Semi-technical subjects of interest to operating men such as handling material, elevators, gas, electrical welding, etc., will be discussed. You are invited to attend these meetings during the coming year.

The Engineering Section has research committees on subjects like static electricity, flywheels, guillotine paper cutters, etc. These are safety problems not limited to any one industry.

SUPERVISION AND SAFETY

H. A. COFFIN, CADILLAC MOTOR CAR COMPANY, DETROIT, MICH.

I am not going to try to preach a sermon to those of you who are better ministers of the gospel of safety than I can ever hope to be. On the other hand my inexperience perhaps has its compensations for I have no pet theory to advocate, nor shall I be foolish enough to attempt to set up any cut and dried series of notions which might or might not be founded upon the facts. In other words I have no new fangled plan of action to sell you and for that at least you can be truly thankful.

I think it is apparent to all of us that a certain toxin has entered into the blood of this present generation and the family name of that toxin is "Speed" and the first name of it is "Hurry." and the deadly disease which that toxin develops is "Carelessness and Recklessness" accompanied by utter disregard of the consequences which tomorrow may bring for the thoughtlessness of today.

Often my mind goes back in thought to the home of my grandfather, whose simple faith and beautiful simplicity of character has always been an inspiration to me. How unhurried was his method of living, how comforting his daily program compared with that which falls to our lot in this more modern era.

At seven o'clock each week day, the good old fashioned maid who combined the functions of cook and butler, of janitor and chambermaid, at three dollars per week, called him from his peaceful slumbers. Leisuredly dressing himself he was downstairs at 7:30 and taking the daily newspaper from the front steps, he retired to the library and calmly read it from cover to cover. At 8 o'clock the mess call was sounded, to which the whole family responded in mass formation and partook of a repast that would stagger our modern stomach. Fruit and cereal, eggs and bacon, with a liberal allowance of flapjacks thrown in on the side, was consumed with avidity as the family discussed the common ordinary events of family interest. At the conclusion of the repast chairs were pushed aside and the good old book was brought forth and at the conclusion of one of the Psalms, or a chapter from the Gospel of John, the family knelt while Grandfather led them in prayer to Almighty God for blessing and protection for the work of the day ahead. Then donning his hat and coat and taking his gold-headed cane he unhurriedly walked to the family store where the orders which Grandmother had entrusted to him were carefully delivered to the grocer, the butcher, the

baker and the candlestick maker, then to his office for the transaction of the business of the morning. Promptly at 12 o'clock the office was closed in order that he might walk back home once more to luncheon with his family, then back for the afternoon until about 4:30 the office shutters were again drawn and he was back at home to hitch up old Dobbin and, crowding into the capacious carry-all, the family enjoyed their usual afternoon ride. After a simple dinner the evening was spent by the old folks in chatting or in reading and by the young folks in studies or games around the fireside. Promptly at 10 o'clock the family gathered around the library table for evening prayers and by 10:30 the whole family was in bed and at peace with the world.

HIGH PRESSURE METHODS OF PRESENT DAYS

This picture I am sure will find its counterpart with everyone of you. Those were the days when arterial sclerosis and high blood pressure were unknown. It is, without doubt, equally true that our modern chemistry that has since successfully cowed the typhus germ was then unknown and that all the bugs in the human anatomy were allowed to romp in unmolested glee. Many an illustrious sire undoubtedly perished from good old-fashioned stomachache in blissful ignorance of the fact that he was afflicted with an attack of appendicitis and infant mortality was high but "where ignorance was bliss, 'twere folly to be wise," is probably the philosophy that comforts their spirits in the Promised Land.

Today, how different is the picture—father arises, hastily makes his toilet and descends to the dining room table three jumps ahead of the rest of the family, swallows his coffee, securely hidden behind the pages of the daily newspaper, two minutes for the headlines, one minute for the stock reports, thirty seconds for Andy Gump and he is on his way to the waiting automobile. With one eye on the motorcycle cop behind and the other eye on the stream of traffic ahead, he rushes for the office. With telephone in one hand and correspondence in the other, he dictates his answers and then rushes from one conference to another until noon. He must forego the privileges of a luncheon at home for a Committee Meeting of the Society for the Prevention of Breeding Long Haired Dogs awaits his attention or possibly it is a Directors' Meeting of the Golf Club that calls him, or a drive to get to the Rotary Luncheon on time, then madly back through the traffic to his office. Some important letters must be signed and in a tremendous hurry in order that he may not be late to his appointment with the foursome. Then back to a hurried dinner in order that the family may not be late for the second show, or perhaps it is a meeting of the bridge club or the Oarsmen's Ball, that demands his presence until some time after midnight he drags his weary bones back to his domicile there to open up anew the perennial and unsettled question of what time Johnnie and Susie should be expected to report at parental headquarters and finally to bed to snatch a few fitful hours with Morpheus before the program of another day shall present itself for his consideration.

Possibly the picture may be somewhat overdrawn but certainly not so much so that all of us will fail to recognize it.

And how truly does this picture of our changing methods of living have its counterpart in our present industrial life as compared with the industrial life that our grandfathers knew. Then everyone was paid by the day no matter whether he earned it or not and no doubt many were overpaid. Those were the days of leisurely production, of slow speed machines, when the forces of competition had not yet gained such headway as that before which we are driven today. It is true that they did not produce much and that the wealth of the nation was not increased by leaps and bounds almost overnight as is the case today but certainly there was present a certain sure-footedness and steadiness of pace to which our present high speed methods of production have made us strangers.

LATE AFTERNOON IS DANGER HOUR FOR WORKMAN

Then there were no troublesome Taylor theories of management to bother, piece work prices with their constant nerve enervating stimulus to haste and hurry were unknown. Today a man is paid for what he delivers, the more he delivers the more he is paid, he has no time to move leisurely for leisurely movements are now expensive. The chances are, by afternoon that under the constant struggle to produce more, and so earn more, his powers of sight and hearing have been lessened by fatigue (particularly so if he has been out with the family at the movies into the late hours of the night before) and his step is a little less sure, his chances of making a mistake that will result in another accident a little more certain. Then the application of electricity with its high speed motors and dangerous voltages had not made its appearance. Today there is hardly a square foot of our modern factory that is not charged with sudden death for him who is not constantly on his guard.

Then our cutting speeds rarely exceeded 25 or 30 feet per minute, now high speed cutting steel has come and our cutting speeds have been increased from 25 feet to 500 feet and more. Our machines are revolving at speeds that would have seemed terrific to our grandfathers, with consequent exposure of the operator to danger from flying chips and broken tools, our drill presses take up with lightning speed. Our grinders and our sand blast machines threaten danger to one's eye-sight on every hand.

Then our cutting compounds consisted of lard oil or some other mineral oil derivative, more antiseptic than they were dangerous. Now soluble oil, less expensive and equally desirable as a coolant but more liable to turn rancid and invite the deadly germs of tetanus or blood poisoning have taken their places.

Today conveyors, and tramways, and cranes and electric trucks and elevators, and hoists threaten danger at every turn. The science of the heat treatment of metals has come into our modern production and brought with it the white hot metal that must be handled and the vats

of boiling oil in which it must be plunged and all too often is some human life snuffed out under the giant forces unleashed by this development of our industry.

And last but not least, we make it a hazard for a man to even go to his work. He must dispute the right of way with autos and trolleys and busses and trucks and the deadly jitney so that it may truthfully be said that we divide our modern population into two classes—the quick and the dead.

What the net result of all these developments might be so far as the safety of life and limb is concerned without the application of those principles which are at the foundation of your organization, I do not dare to think. Certain it is that the toll of life that would otherwise be exacted would equal, if not exceed, that produced by one of our modern wars.

You have come in as with the ministering hands of angels and have provided guards for our machines, goggles for our eyes, runways and traffic cops for our trucks, inspectors and gates for our elevators, special devices in our factories for handling molten metal, special tools for our heat treating plants; you are even teaching us to quench in water instead of oil with far less fire hazards and you have given to us a thousand and more other devices too numerous to mention here, not the least of which is our industrial hospital and the first aid kit, all of which constitute themselves into a mighty force beating back the hand of death and teaching the principles of safety so that all who run may read.

Best of all is the philosophy of safety you are preaching in our plants and the education of the workman to the hazards of his job.

There is another factor that is entering into the hazards of our modern production methods. We have reached a point under the compelling forces of competition where under the law of the survival of the fittest those industries who can still further increase their productivity in proportion to the amount spent for labor are those who will forge ahead. I was discussing only the other day some of these matters with a certain plant which had recently decided that it must set as an objective for itself the increasing of its production by a figure equal to 30 percent, with but little more than a nominal increase in the number of its operatives and after we had discussed some of the problems connected with this increase of production for a while, I asked the safety engineer of that plant what had been his experience with the number of time losing accidents that had occurred since the increase in production had been under way. His reply speaks for itself—*“The number of accidents has increased nearly a hundred percent.”*

The forces that drive us on in this modern industrial era are irresistible. If we attempt to buck against the spirit of the times we are, for the present at least, doomed to almost certain failure. Therefore, I see in the constantly growing interest you are sustaining in this great organization of yours, our only real hope for the continuing insurance of safety to our employees. As the production manager and his assistants are

redoubling their efforts so you gentlemen in your organization must recognize the necessity of redoubling yours. What has been done in the past is not going to be good enough for the necessities with which you will be confronted in the future.

SUCCESS LIES IN PLACING OF RESPONSIBILITY

I recognize that it is idle to point out the necessity for increased activity on your part without at least suggesting some of the ways in which you can work and bring this about and in suggesting it as I come to the closing of this rather informal address, one suggestion has come to me out of a conversation I had with the industrial manager of one of our large modern plants. I asked him what they were doing in that plant to teach their operatives the principles of safety and insure them against the loss of life and limb and he replied that they had a safety engineer on the job, one of the members of their own organization, who was doing faithful and conscientious work. I said, "Does he report to you?" He replied, "No," and when I asked him the reason why, he said, "He used to report to me, but now he reports to the head of the maintenance division." When I asked him why the change had been made he said because under the old arrangement changes that were suggested or installations that were recommended were all too slowly adopted because the maintenance division did not then so fully appreciate its responsibility for the recommendations of the safety engineer. Now that he reports direct to the head of that division he is one of the department and his recommendations are acted upon with less delay. There you have the text for the subject assigned to me by your chairman—"Supervision and Safety." The moment those who were responsible for the supervision of the plant came in daily contact with the principles and the teachings of the safety engineer, their responsibility for life and limb became immediately apparent and was recognized as too great to be denied.

In reading through the report of your meeting at Detroit a year ago, I was impressed with the number of papers that were presented emphasizing the importance of educating the foreman and transforming him into a preacher of your doctrines, but how much can you expect of a foreman unless the man to whom the foreman is directly responsible and to whom he must report is himself imbued with the importance of these same principles.

Possibly the time has come for you gentlemen to turn the searchlight of your organization not only upon the foremen but upon the superintendents of the factory and last but not least, upon the general manager himself. How many general managers are there who take time to talk things over thoroughly with their safety engineer, or who will carefully go over the figures of the loss of life and limb. How often is it that the general manager learns indirectly that some unfortunate operative has fallen into the boiling oil, or been mangled in some conveyor, and shocked by the fatality sends a message of condolence to the widow and possibly some flowers to the funeral and then in the press of other matters pro-

ceeds to forget the incident. How many general managers are too busy with the reports of the sales manager or statements of the comptroller or the figures of costs with reference to the product, to take time to investigate earnestly and seriously as to whether the safeguards against accident in his plant are as adequate as they can be made or whether the work of the safety engineer is being performed as satisfactorily and as efficiently as our modern concepts of service to our fellowmen demand that it should be.

I am not concerned here with preaching to you about how the supervision can make your practice of Safety First effective. You have demonstrated that you understand the importance of supervision in your own experience, as is shown by the papers presented at meetings prior to this. I am concerned with the hope that you gentlemen will find some way of presenting your message so forcefully and so clearly and so directly home to the general management of our plants that there may come from the fountain head of authority in our great industries today clear and unmistakable edicts the result of which shall be of an awakened intelligence and a thorough understanding of the obligations that management has for the safety of those who work with their hands. If you gentlemen can in this convention either assembled as a body of the whole or through some well selected committee, devise some method of bringing your story crisply and clearly before the general manager of today and fire him with enthusiasm with the inspirations that have led you men on through these years, then I believe that you will have accomplished much in the way of meeting the increased hazards to life and limb that are the direct result of our constantly speeding up in our modern methods of production.

DISCUSSION

Mr. W. F. Sterne (American Radiator Co.): Mr. Blank has asked me to lead the discussion on the subject of "Supervision and Safety." It has been my experience without any question that Mr. Coffin's idea is absolutely correct, that there can be no safety work of any success or any magnitude unless we get the complete cooperation, backing of the management of the plant, etc., in personal interest or condescension. I would like to hear from several of the other safety engineers or foremen, if necessary, of the different plants represented here, in regard to this matter.

Mr. John E. Walters (General Electric Co.): Can some of you people tell me how we can get cooperation from the individual? The West Lynn plant of the General Electric Co. has the lowest accident average of any allied concern in the state of Massachusetts, yet I find my battle with the individual in spite of the supervision. Tell me how to handle the eye case, how to make visits to the dispensary compulsory outside of firing a man. You cannot afford to fire labor for trivial causes.

Mr. Sterne: I have found a plant here in the city that has a rather gruesome and peculiar method of deriving a solution of the goggle problem. The safety inspector or engineer of the plant found it a very

difficult thing, in certain departments of the plant where eye hazards were in great numbers, to get the men to wear goggles because they claimed goggles hurt their eyes.

The inspector, in the first place, starts a little propaganda of his own by taking a glass eye, having photographs of injuries which occur from non-use of goggles and carrying them around, until he had converted, in part at least, those people who seemed to be oblivious to the dangers which surrounded them.

It was found also that a great many of the men had difficulty in seeing their work due to the bad lighting conditions of the department, and also due to the fact that they had defective vision, and it became necessary in several companies for those men to have their eyes examined and tested and have their goggles ground to prescription.

Mr. Cotcher (Maxwell Motor Corporation): The safety engineer is not the man to exercise authority or argue with individuals. My status is as a staff officer of the organization, an advisor. I think I would be making the biggest mistake in the world and losing a great deal, if I tried to argue with the individual man. We get to it a little differently.

We started on the theory that the foreman was the most responsible man, but that the foreman could only do what his chief backed him up in doing. Mr. Mitchell, our vice-president in charge of operation, got interested in the safety movement; he is thoroughly sold on it and is backing it from the start to finish. He conceived the idea of holding contests between departments and placed on me the responsibility of conducting them.

It has proved a wonderful success. We took the different departments with their kinds of work, we placed a bogey rate on the department, based on the class of work they were doing, that rate being in the insurance company's terms of so many cents per hundred dollars pay roll. We multiplied that rate by the average weekly payroll of the department, giving them a dollars and cents bogey per week. That is what they were to shoot at. We lined up all of the departments in each plant according to their bogey. We charged the accidents against them in dollars and cents so that they always had before them a tangible figure which they could achieve because they could jingle those dollars and cents together in their own pocket. We figured the individual workman reacts to about 90 per cent what his foreman tells him. These foremen are competing against each other. They get a suitable prize. The winning department of each plant is given a dinner, then they hear their Mr. Mitchell or some other high executive reiterate the corporation policy on safety.

FOREMEN MUST BE SOLD

The prizes only cost the company fifty dollars apiece, and they save the company a thousand dollars apiece probably. Now, to get to the man you have got to get to your foreman. A good share of the men around the plants know me, but if I go to them they are ready to start a

fight; they want to know what business I have butting in. I don't go to them, but if I find a foreman who says that he can't make his men wear goggles I know he is a darned poor foreman. If he believes in them and he is the boss his men wear goggles. If they are not wearing goggles he is either a weak sister or doesn't believe in goggles, so there is not much use trying to fight the individual man. He is here today and gone tomorrow; the foreman and superintendent stay, the general foremen stay and the division superintendents stay. If you sell them you have the outfit sold, and if not they are not sold.

Mr. Thalner (Buick Motor Car Co.): Regarding the increase in labor turnover as a result of compelling men to wear goggles, we had a little instance of that at the Buick. On our construction job one of the foremen was a little lax about having the men wear goggles until the superintendent as much as told him that he would have to have the men wear goggles or there would be another man on the job. The foreman then went after it.

At first he said that if he tried to make these fellows wear goggles they would all quit. His foreman said all right that if they did quit they would hire new men. He went out on the job and ordered goggles and brought them to each man and had each foreman deliver the goggles personally to the man with the instruction that they were to wear them, and if they didn't want to the release was waiting in the office. Not one of the fellows came to us asking for release, and all of them wore the goggles.

Mr. Phelps (Link Belt, Indianapolis): In a grinding room, say of 30 or 35 men there may be 30 or 35 different shapes of faces or noses, and we got around the problem in this way successfully: We picked out about five or six different types of goggles, all of which were a safeguard for grinding work. Then we went to the foreman of the department and said, "The men have got to wear goggles absolutely." Then they had no excuse. There is a little more expense in keeping a larger and well rounded stock of goggles, but we find in doing so we get the men to wear the goggles.

Chairman Blank: I believe that not only in the goggles proposition but any other safety measure, if you go about it in a business-like way and they know you mean business you won't have any trouble from labor turnover.

PUNCH PRESS HAZARDS ✓

A. L. KAEMS, SIMMONS COMPANY, KENOSHA, WIS.

What is the trouble with us that we have so many punch press accidents with all the devices that have been made to guard against this? From year to year we read that the loss on punch presses is increasing. There must be something radically wrong if that is so. If the guards we have all bought and used on punch presses would have done what was claimed for them we would not have had this trouble. It must follow that the guards we have been buying and using are not stopping our accidents.

I went with the Simmons Company four years ago. They used a great many punch presses when I went there, something like 500, and they had many accidents.

I didn't start out very strenuously at first. They had all the devices that were on the market and that had not stopped their accidents, so I started out to find out what caused them. We say the men are careless. Just stop and think. The causes of punch press accidents are due to the fact that the man must place his material into the die and take it out. Supposing a man does 12,000 pieces a day. That would mean putting the hand into the danger zone twice for an operation, putting it in the danger zone something like 25,000 times a day, and putting the hand in something like five to seven million times a year.

I started to work out a system whereby it would not become necessary for the man to place his hands in the danger zone and we were very successful. We had one department that in 1919 cut off twenty-four fingers. That department has now run for three years without an accident.

What we did isn't so spectacular. It is something we all can do. It only needs a little thought. The thinking can't be done by just one man; it must be done by all who have anything to do with the work.

A little piece was to be made into a "U" shape. They had always done it by laying it into the die and the press pushing it through. A man always had to put his fingers into the danger zone and I said, "Let's turn the job around." They said, "You can't. That job goes through and the piece will fall through."

I found out how far this piece would go before it would tip. If they had done as I did and found out where the tipping came and measured over the opening they would have found the piece bent over before it tipped, and it was easy to turn the job around and slide it in.

Then I took the second job. They had to lay this in very carefully. It made a curved piece, and the fingers always came where the punch came. I said to them, "I will turn that job around."

They said, "How will you locate it?"

CHANGING LOCATION OF PUNCH PRESS WORK

If they had taken out their rule they would have found that that curve and top was widest, that we could go ahead and cut away part of the front of the place where it was located, for that was not interfering with where the punch was doing its work, and it would slide in very easily. Then the foremen began to see that we were beginning to get somewhere, and they said, "There is another job coming. We lost three fingers on that last year."

It was a sizing job, and they had to set it into the die. The trouble was that, in setting it in, a man worked fast and having his fingers inside of the piece the punch came down and caught them. The first thing we did on that job was to take off the stripper and put the stripper on the punch. Then we found out we could slide the piece into it very

easily. It would slide, but as it stripped off it would fall back into the die. We had a man knock it away with a stick. We found that was inconvenient, so we took a piece and set it on the side of the press. When the punch came down it pushed this back and as the piece was sized it brought it up. The man has nothing to contend with any more except putting the pieces on, one after another.

That little job increased production 150 per cent and the reason it didn't increase more was because the press didn't run any faster. You see these are just horse sense methods.

There came a redraw job. This piece is round at the bottom, and you can't push it because it is bound to fall over. When that job came on the foreman said, "What are you going to do?"

We tried to push it into the die. When it came to where it was going to fall into the die it would always tip. What we did was to put a little tension spring on the side to hold it out, and now all a man does is sit and push ahead one piece after another. That was very simple; yet it took us some time to find out what could be done. It is just as simple as rolling off a log when you get to it.

Here is one that probably took us longer. The piece is made into a ball and as it is heavy at the bottom and light at the top it always wants to tip. Three and a half years ago I gave a talk at one of the section's summer sessions. I had just started this and said we would have to slide that through a tube, and that is what we have worked out, and it goes into the die every time. So you can see no matter how difficult many of these things are, if you will stick to it you are going to get the thing to work.

I am telling you that 75 per cent of all the punch press accidents in the country could be wiped out like that.

ONE DEPARTMENT HAD THREE YEAR NO-ACCIDENT RECORD

This department I told you about that had gone for three years without an accident increased its production sixty-five per cent and that, of course, paid for all the work. Turning this job around that I just showed you saved us eighteen hundred dollars last year. That didn't cost us twenty-five dollars. So I have lots of money left to do other work with. I am sorry that I couldn't bring the hundreds and hundreds of dies that we have made safe. We have probably four thousand dies and probably very nearly one-half of them made safe so I don't have to worry over half of them.

Chairman Blank: I am sure you agree that it is very simple if you know how, and Mr. Kaems will be very glad to demonstrate any of these dies he has brought here with him to any of you who are personally interested. This exhibit is going to stay here all of the time during the duration of the Congress, so you can get in touch with these men and they will demonstrate their things.

I will call at this time on Mr. Sanford.

Mr. G. E. Sanford (General Electric Company): Without any preliminary remarks, I will ask to have the lights put out and I will run right through these.

Mr. Sanford showed some slides illustrating improved methods and devices for safety work.

Mr. C. B. Auel (Westinghouse Electric Manufacturing Company): Only a few years ago the punch department of the average industrial establishment was called the slaughter house and properly so, and our own was no exception to the rule. Today most concerns have made considerable progress away from that condition and ours, I think, may be said to be among those who have made the most headway, although I am free to admit we have not yet come to that degree of excellence reached by Mr. Kaems when he said he had a department go for three years without an accident. I am inclined to believe that some of that is due to the fact that he has more of a standardized product to deal with than we have.

Mr. Coffin touched on the necessity of supervision from the heads down. We have been particularly fortunate at our plant in having a management that has been blessed with a vision and when I speak of the management I include not only the head executives but the other executives including the superintendent of our punch department. He is a man that has been blessed with a vision and one who has been able to turn this vision into a real thing.

We were fortunate in moving our punch department into an entirely new building where we could give every tool ample room. I think that lack of room has considerable to do at times with the accidents, and there is too much tendency on the part of many managements to crowd one tool after another into space originally intended for a considerably less number, before they consider the erection of additional floor space. When you have ample room around the tool you also have ample passage space so that the traffic back and forth is not liable to interfere with the press operators. You also have ample facilities for getting the material right up to the press and the same facilities in removing the material promptly away after it has been worked on, including the scrap. A really serious accident is almost unknown nowadays in our punch department, but we still have accidents, and I give you my word I don't see how you can get away from them entirely.

Then again we have excellent lighting facilities—not only general lighting but individual lighting at the machine tools.

INSPECTOR CONSTANTLY ON WATCH

Another very important thing that we have introduced has been a safety patrol. We actually have a man who was formerly assistant foreman devoting his entire time to patrolling the punch department to see that the men are handling their tools properly.

This man, as a result of his experience, has made some very valuable suggestions, but the point that I wish to make is that we have found it has paid to have an actual patrol going on every day in the week in

our punch departments for no other purpose than as I have said, to see that the men, particularly new men, are handling themselves and their tools properly. We do not believe in any guard that allows the operator to put his hands into the danger zone. I don't care what other kinds of guard you have, sooner or later there will be a screw come loose or a bolt or nut drop off, and an accident will happen. In other words, where an accident *can* happen, an accident sooner or later *will* happen.

Here is a little swab as we call it—nothing but a wooden stick with a piece of felt on it. The felt is dipped in oil and used to swab the dies. At the same time there is enough roughness or hair on the felt to enable you to pull the punching out from under the die.

Here is a little suction device we think very well of. It is provided with a little sucker such as all of you used to make as youngsters. It has a little finger so that in event of the punching sticking it can be loosened, then all it requires is just a squeeze of the bulb and it will lift 14 pounds.

Some of you may say that it will only do for flat pieces, yet we have made them with two of these on and here is a piece showing that it can also be applied to an irregular surface. That same scheme has been applied to some of our big work. This is only on a very small scale; this goes through the press and by means of it we have not only made the actual job safe but we have eliminated the necessity of the man back of the press whose job it was to feed the long sheets in under the press. The operator sits in front of his press, pushes this thing through and it runs on a little monorail, then it drops down on the sheet. He squeezes the air valve in the handle and this sucker clamps the sheet and he pulls it towards him and releases the air pressure suction. The piece drops on the die, after which he manipulates the press by gripping the piece at the sides and pulling it through until the work is done. That is a case where we have actually cut the cost of production in two by the elimination of one, as well as eliminating accidents.

ACCIDENTS DUE TO DROPPING DIES

We had considerable trouble with accidents due to dropping dies. The dies are always greasy and when they begin to be of some weight there is a decided tendency at times for the men to drop them, so we make it a point to equip all of our dies with lifting eyes and we have portable trucks.

Another thing we have done has been to cut away the front of the dies so that there is less danger, in case the worker has to put his hands into the danger zone, of getting his fingers nipped.

One of the big, and I think unique, things we have done has been to make the guards a part of the die. Formerly we had elaborate guards, but for some reason or other they would be taken off the press perhaps when changing dies, and they would not be put back, so we have commenced the practice of making the guards, such as you see here, a part of the die itself. When the die is removed the guard goes with it. When the die is brought back the guard is right there.

Mr. H. S. Putnam: I think Mr. Auel and Mr. Kaems hit the nail on the head when they said the best way to eliminate accidents was to arrange your presses in such a way that the operators would not have to get their hands or fingers in the danger zone. As Mr. Kaems said, it is surprising to see, after a little study, how many operations in your shop can be so arranged. True, it will take a little work. It may look complicated at first, but sometimes you can just reverse your operations. You can put on chute feeds, dial feeds, automatic feeds, and thus eliminate entirely the necessity of the operators getting their fingers near the punch.

Some of your work may be what you might call shallow work, that is work you may not think the punch would pick up and leave in the die. That can be overcome by the use of vacuum, or else put a little rubber vacuum cup which will answer this purpose, and that in turn can be injected either with a spring knock out as Mr. Kaems had or compressed air.

You might put punch press work under two classifications, what I would call ordinary sheet or strip cutting, which might be called first operation work, and forming, slotting, reducing, that kind of work what you might classify as second operation. Now, it is evident that the guard that might be suitable for the first operation work would not do for second operation work.

In cutting from strips or full sheets it is desired to get products and to keep the spoilage down to a minimum, and at the same time afford safety to your operators. That is where the guarding of punches themselves come in.

I don't believe it is necessary to have a reduced production if you have the right kind of a guard. It has been demonstrated to me that the proper kind of guard will more often increase production than reduce it. Granted, there may be some jobs that are very hazardous, very irregular in shape and which may mean that you get a reduced production if you make the job safe, but they are in the minority.

Mr. Putnam then showed a number of slides.

Mr. Harry R. Sinclair (President, Worcester Stamped Metal Company, Worcester, Mass.): The Worcester Stamped Metal Company is an old established business with modern buildings and equipment devoted almost exclusively to the manufacture of accurate stamped metal parts to order, generally not machined, polished or assembled, and manufactures stampings from the lightest up to redrawn parts weighing four pounds each and plain work much heavier.

The blanking and redrawing presses vary from 1" to 15" stroke and are mostly 4", 5" or 6" stroke and, including the necessary cam double action presses, we have between 50 and 60 machines.

The redrawing presses have cam operated under-motions and bar knockouts and are fitted to handle as wide a range of work as possible.

We are provided with all the necessary tool making and hardening equipment, with plain and semi-automatic squaring lathes, stock shear-

ing, tumbling and annealing devices, but in this paper are neglecting most ordinary machine shop hazards and confining ourselves to power press safety work.

The management of the plant has been alert to safe practices for a number of years and has always had full cooperation from the foremen.

The subject of safety is emphasized in our shop paper, "Stamping Life," by the use of the National Safety Calendar, by safety meetings and by the use of Safety Bulletins which have even been displayed at the shop picnic, where the wives and children were interested. We cooperate with the Worcester County Safety Council and our foremen have attended their schools. We have weekly inspection of the shop equipment giving special attention to clutches, frictions and danger points on presses.

We also keep a novel daily record of the safety devices in use to place responsibility and check the effectiveness of our methods. This consists of a suitable list of the machinery arranged in groups corresponding to the control of the press foremen. An actual record of the device in use at the minute of observation is taken, the sheet being a bird's-eye view of the condition of machines as regards safety. In our plant this record can be made in a few minutes and its examination, if any accident occurs, shows where any tendency to slackness has developed.

The mere fact that every operator and foreman knows that this record is being taken is a strong inducement to use safety devices and calls all slackers to the attention of the safety inspector.

MECHANICAL GUARDS

Our presses have belt and fly wheel guards, gear and backshaft guards. The only real novelties are among the fly wheel guards. The lighter ones are hung on semicircular frames suspended at two points near the top of the fly wheel and concentric with it. They automatically adjust themselves by gravity to the position of the presses which have to be changed from the inclined to vertical position frequently and are locked securely by thumb nuts.

Some guards on back geared presses are suspended by a single bolt on the axis of the pinion shaft to a heavy iron bent to fit the frame of the press and which just clears the shaft end. Both the above guards open in such a way as to make the belts and wheels accessible.

We have no record of any accident from strictly blanking operations which are practically all done in the strip but we are now adding treadle guards to prevent occasional setting up accidents. Though we have considerable work where no point of operation guards are necessary, as the fingers are not in the danger zone, most of our trouble has come from reoperation work.

It is becoming more and more our practice to design and provide safety devices when the tools are made, whenever the quantity permits.

As a single method of protection proved inadequate we have gradually developed the use of four systems of guarding which seem to be the best adapted to our work, and sometimes we combine two methods, using one for each hand.

Instead of this being a difficulty it suits the needs and spirit of our practical press operators and foremen. We leave them considerable latitude as to choice of safety methods on jobs which are not equipped in the tool room and they generally choose the best method without trouble or delay.

OPERATION GUARDS AND HAND TRIPS

We tested, one after another, several kinds of point of operation guards then on the market and discarded them after longer or shorter tests, as we were then looking for a single device which could be universally adapted to our varied presses and which would suit the men. This cure-all we have never found. We, however, finally developed, for our own use, a gate guard which is effective if correctly set and which slows up production less than some mechanical guards. It is normally hung in front of the ram slanting back against the punch. We call this the Pull Guard as when pulled forward into a vertical position it guards the tool space and trips the press, for it is direct connected to the clutch. It is on exactly the same principle as one developed by the General Electric Company which pulls down instead of out. It has the advantage of requiring only one hand to trip the press yet it guards both hands; a trip and guard combined.

If the nature of the tools or stripping devices prohibit the use of the Pull Guard we sometimes remove the gate using the lever mechanism only as a one hand or right hand trip. It then is necessary to protect the left hand by pliers, by an implement, or by a left hand operation away from the danger zone simultaneous with the tripping of the press.

The above devices entirely eliminate the foot treadle hazard, and the failure of the mechanism or its connections leaves the press untripped. There seem to be no attendant mechanical hazards.

The advantages of chutes as safety devices were brought to our attention by Mr. A. L. Kaems in the *National Safety News* and though we had occasionally used them from a production standpoint their full significance as adapted to a wide range of work had not dawned upon us. We felt some reluctance to use chutes extensively as it meant a return to the foot treadle but we are proving daily that chutes are both safe and speedy though we oblige our operators to use a stick for straightening any work inclined to stick in the gages.

A serious unnecessary accident of the finger within the cup variety on a heavy press suggested the possibility of pliers for this work and through the courtesy of Mr. G. E. Sanford and his company we were immediately furnished samples of their soft nosed pliers. Though it had seemed to us that pliers would never be adapted to our work we found that they were excellent from both a safety and production standpoint and we have jobs where our men use two pairs of pliers and operate the press continuously in safety on parts weighing as much as two pounds each.

We are also constantly devising implements of flat wire which are extremely useful.

We of course use permanent barrier guards and semi-automatic devices when we can but have in regular daily use the four systems of guards we have described as follows:

1. Pull guards.
2. One-hand trips combined with pliers or implements.
3. Chutes combined with implements.
4. Pliers or implements.

It is a surprise to us to see the new kinks which our foremen suggest as they continue to use these methods and we have a mutual feeling of pride in the results. This is not that we have no accidents, though we have greatly improved our record, but it is practically impossible for one to occur where the man uses the appliances properly.

We are trying to hasten the day when no fingers are put under unguarded tools.

APPOINTMENT OF NOMINATING COMMITTEE

Chairman Blank: I am going to appoint on the nominating committee R. A. Shaw, Chairman; E. J. Clark and H. Campbell.

This committee will report tomorrow on nominations for next year's officers.

WEDNESDAY MORNING SESSION

Chairman Blank: I notice by the number that have gathered around the punch press and other exhibits that there has been a great deal of interest displayed. This afternoon at two o'clock we will have a continuation of the discussion on punch press hazards in this room. We plan next year to devote the most of one day's time to punch presses alone. Each year we give punch presses a better place on our program, and each year we fall short of having time enough, so that next year we want to have a larger exhibit than we have had this year, more samples, dies, and photographs from a larger range of manufacturers.

The first speaker on the program this morning is a man who has had experience in compiling accident statistics in an automobile plant. The Statistical Committee this year has done a great deal of missionary work in trying to get all of the Automotive members to report accidents on the standard basis.

THE VALUE OF ACCIDENT STATISTICS ON THE STANDARD BASIS

R. F. THALNER, SAFETY ENGINEER, BUICK MOTOR COMPANY, FLINT, MICH.

The use of statistics in any work, whatever it may be, is absolutely necessary. Let us take for example, any other line of work and see if we cannot find conditions which are analogous to our own along the

line of statistical information. For example, can you imagine a large department store in any of our cities being run successfully without an accounting system? Is it possible to run an employment department without records of the employees? Can a game of baseball be played without keeping score? Can you play or do you play poker without keeping mental record of the cards dealt? Is it possible for you to tell me what gas mileage you are getting out of your car without checking it up? Innumerable instances such as these might be cited to show the general use and value of statistics but it is unnecessary to go further because they all resolve into the same fundamental principle, that to measure anything we must have measuring apparatus.

To carry out this work proper attention must be given to the recording of all lost time accidents, to the investigation from a neutral standpoint of every lost time accident, showing the exact cause of the trouble, making it possible then to apply the remedy. To be of practical value, accident records must include a complete story from the time the accident occurs until the injured person is back at work or the case otherwise adjusted and closed. This requires cooperation between the safety department, medical department, employment department, accounting department, and often many other departments, and of course means work. But if we are going to have records, why not have them correct? If a job is worth doing it is worth doing well.

To be able to compile a report on our past experience we must have records which will show what our past experience has been, and this is not a task that is impossible by any means because, by the proper application each day of a small working force, these valuable records can be kept very easily. I think our main trouble is that we are treating this proposition as a thing too technical to trouble with, when it is just an ordinary, everyday job of the proper tabulation of facts.

Is the management of your factory content to let your work go on, keeping no record of your experience—nothing to show whether you had two or fifty lost time accidents last month, what caused them, what your severity or frequency rates were, and how they differed from previous figures? If the management is content it is not behind you in the safety work in your plant as it should be, and, consequently, you will be unable to interest them and show them by figures, whether or not you are making any progress.

RECORD OF BUICK MOTOR COMPANY

Figures have been compiled showing the experience of the Buick Motor Company, in which the cost of pure compensation per hundred dollars pay roll has declined steadily until it is now 36½ per cent below the 1920 rate. Among other notable savings has been the number of eyes lost, that dropping from twelve in 1920 to five in 1921 and four in 1922. Employees have also profited from the results of safety work as is shown by the figures compiled which indicate that at least 2,651 Buick employees have been saved from serious accident since 1913. The average lost

time for such accidents during this period has been 31 days. Basing the saving on the average of 31 days for each case at the very low rate of five dollars a day, the amount is \$400,000. In other words, this approximate amount of money has been saved to employees.

The saving to the company is reflected in the reduction in the compensation and medical costs. The average compensation cost of lost time cases during this period was \$57.05; therefore the compensation saving through the elimination of 2,651 accidents would be equal to \$151,239.59. This, of course, does not take into account labor turnover which must be figured on almost every lost time injury, and which may be estimated at from \$50.00 to \$200.00. Taking the lowest figure of \$50.00 on 2,651 cases, we would have a saving of \$132,550 on labor turnover alone. In addition to this, it would be necessary to figure that a good deal of scrap and breakage would be caused by a new employee learning the job; the loss of production and the additional wear and tear on tools and machines. Totalling this compensation saved in the last four years plus labor turnover would therefore equal \$283,739.55, which represents the money which the Buick Motor Company has saved through accident prevention work. Of course, this does not figure at all the gain through uninterrupted production, the gain through increase of production by the use of safety devices, and the intangible but vital strengthening of the plant morale through the elimination of these accidents.

These figures I have just cited were made possible because we have endeavored to keep a record of our accident experience at the Buick. They tell a very interesting story, one which must and does show the plant manager that it is a business proposition which pays dividends and one which shows the employees that to be free from accidents is as much their gain as the employer's. It is just a part of statistical work and shows the real value that statistics can be put to.

THE VALUE OF THE STANDARD BASIS

Now, if we are to keep records, and I think that most of you will agree with me that this is absolutely imperative, why shouldn't they all be kept on some standard basis? Why persist in using some particular method of your own to the end that we have as many varieties of accident reports as there are spots on a tiger? It doesn't matter whether a plant works eight, ten or eighteen hours a day. That doesn't concern us at all, and shouldn't make a particle of difference in making up a standard report. The thing that concerns us is whether or not we can pick up a Ford report and see how we stand with him—an Oakland report, a Dodge report, a Chevrolet report, or any other plant, and compare notes on a standard basis. There is nothing for me to gain if I compare the Buick report which is compiled on the standard basis, with some other report which is compiled in any other manner, and vice versa, but there is everything to gain if our Buick report can be compared with some other factory report which is also made up on the standard basis.

Picture the endless amount of confusion which would arise if one-half the carpenters in New York were using the English rule system and the

other half were using the metric system. Or try to visualize an accounting system in any large store being run with the use of both Roman and Arabic numerals. Of course you will agree that this is absolutely absurd, but is it any more foolhardy than the practice which is being indulged in now by various industrial concerns throughout the country of compiling their accident records on entirely different bases?

There are companies who do not wish to divulge by means of statistics their accident records. Sometimes the policy of the company forbids giving out any such figures, but this does not occur very frequently because nowadays it is the general opinion that information of this kind should be given to anyone so that the safety movement as a whole will benefit by it. Frequently they state that it is impossible to secure the time necessary to compile accident records. This may be a valid reason but does it really take so much time to keep such records if they are simply started at the beginning of the year in the right manner, tabulating every lost time accident as it comes through? There is also the company which has never had any accidents—until it starts reporting and investigating—but with all this trouble and variation in opinion, we must, in order to read each other's language, get our reports in such shape that they will be comparable with any body else's, and the only means for doing that is by standardizing along one line.

On page 31 of the May number of the *National Safety News* and page 28 of the August issue, you will find a tabulation of accident records using the standard method. It is very encouraging indeed to see as many plants rated as are represented in these two tabulations, and I earnestly hope that those of us who are not as yet rated in that particular table will strive to get into it so that we may have a complete list the next time such information is printed.

ONLY LOST TIME ACCIDENTS ARE COUNTED

As is to be expected, many questions have arisen regarding the standard method which has been worked out by the Statistical Committee of the International Association of Industrial Accident Boards and Commissions in cooperation with the U. S. Bureau of Labor Statistics. Those of you who are familiar with their report will remember that only lost time accidents are counted, that is, those which cause a loss of time beyond the day or shift. The reason for using only lost time accidents is of course that if any minor accidents were included, the plants making the most conscientious record would be at a disadvantage.

The next step is to calculate the frequency rate in terms of the number of lost time accidents per million hours worked. This system certainly is most accurate because it eliminates difference in wage scale, number of hours worked, etc. To calculate the severity rate, or number of days lost per thousand hours worked, the question sometimes arises as to the table of equivalents representing the various kinds of permanent disability. Of course, this table can in no way conform to the compensation law allowances of the various states for death or permanent disability,

because they are all radically different. The figures, 6,000 days or twenty years, for death, are based on the average expectation of life of the average industrial worker who is killed. The other quantities of values for temporary or permanent disability are in terms of fractions of this allowance for death. Of course these figures are open to question, but what difference does it make what figures are used as long as everybody uses the same?

It is well to remember when counting days lost for temporary disability that Sundays are not counted. Saturday is counted as a full day and no allowance is made for holidays; that is, if a man is off six weeks the number of days lost is 36 regardless of the number of hours the plant may actually have worked during that time. The day of injury is counted as the first day lost.

In rating companies they are always placed in the order of their severity rate rather than their frequency rate because, surely, you would rather have 10 comparatively minor accidents in your plant than one fatality. Of course, any small plant is likely to have a serious or fatal accident sometimes without any particular fault on the part of the plant, and this means a very high severity rate for that year, but in the long run these matters of chance will more or less even themselves up.

This brief review will give you an idea of the general procedure to be followed in compiling your records. Should you desire more detailed information along this line, the National Safety Council will supply you with same if you will make your wants known to them.

REMEDIES SUGGESTED BY COMPARISONS

We have used this standard method in the Buick Motor Company since October, 1922, and are of the opinion that it is second to none. We take a great deal of pleasure in being able to compare our standing with other plants which compile their statistics on the standard basis. It gives us something definite to look for—shows us where the other fellow is ahead and where behind, and then, knowing that he is ahead of us in any certain phase of his work, we can get in communication with him and obtain knowledge that will enable us to remedy our job.

I have briefly explained the use of the standard method which has been worked out by the Statistical Committee of the International Association of Industrial Accident Boards and Commissions in cooperation with the U. S. Bureau of Labor Statistics, and which has been adopted by the National Safety Council and many other enterprising companies at this time as the best method now in use for our work. I ask that you consider it in a more serious manner because those companies who have used it know that it is possible to use it advantageously inasmuch as it has already been put to the test. Consequently, each and every one of you should go back to your plants with one idea in mind, namely, that from now on you will use as your method in compiling statistics of your accident experience, this standard method.

DISCUSSION

Mr. Minier: I just want to ask Mr. Thalner a question in regard to the standard method of compiling accident statistics pertaining to cases of hernia. In the standard method they allow six weeks' disability. I believe, but in case a man is operated upon and dies of postoperative pneumonia, do you allow the same six weeks?

Dr. L. W. Chaney (U. S. Dept. of Labor): That question has been debated for 15 years and the committee finally came to the conclusion that hernia could only be treated satisfactorily and fairly by considering it as a temporary disability, and the results of such complications as described would not be considered as a death. He died from something else as a complication. It would not be considered a death under the scheme of the committee.

Mr. R. A. Shaw (Ford Motor Co.): If a man crushed the end of his finger and the doctors put him under ether and the man should die on the operating table, would that be called a fatality?

Dr. Chaney: I think that is a question that has not been determined. As a matter of fact, cases of death under such circumstances are so rare that the committee did not feel it was necessary to give attention to it.

Mr. Herbert (Oliver Chilled Plow): Regarding the publication of figures in the *National Safety News*. It has been the practice to put each firm under a number. Personally, I don't get much satisfaction in comparing my own plant with a number. Wouldn't it be advisable to publish the name of the firm instead of the key number?

Chairman Blank: Most of the plants are willing to give the statistics and their names; there are, however, some plants who will furnish the statistics if they are kept confidential. In order to publish a greater number of these standings the National Council has adopted the method of giving each one of the plants a number.

I think soon the different plants will appreciate the value of this thing and that reluctance will go away and they will be glad to give out any statistics they have and also put their names on these reports, and give authority for publishing the names.

Mr. Demond (Hayes Manufacturing Co.): A case of minor importance which later develops into an amputation, will have to be reopened and carried again and your figures would not show this. It would appear in the first instance as possibly a day or two days' lost time and later whatever the compensation period said.

Mr. Herbert: One more question, about sending the severity rate monthly to the management. Is it the custom in the firms you are connected with to just assume the probable period of disability for a man or get the actual period? If you are going to assume it you are not going to get a true severity rate, if you wait until he comes back to work your records will be behind time.

Chairman Blank: That can be easily answered in this way. You noticed in the report Mr. Thalner put on that some of those men had

returned to work and some had not. For those who had returned the compensation and severity are easily figured but the others are handled on the doctor's estimate.

Sometimes they are a little bit off, but most of the time the law of averages running through there the doctor knows how long a man will be off with a fracture, four to six weeks is the general rule, and if he has not returned to work at the time that your report is made out you have to take an estimated number of days' disability.

I would like to ask at this time—signify by rising—how many report their accidents on the standard basis?

(About eighteen.)

Chairman Blank: I think most of the manufacturers who were on the report which was published in May of this year must be in the room for we have about twenty-five here, and that was the number that reported on the standard basis for last year. I hope that next year we may have a good many more. There were 10 automobile companies that reported on the standard basis for 1922 and 15 motor and accessory companies, making 25 in all, so that most representatives of those companies are here or there are others adopting the standard basis.

Mr. Peet (American Radiator Co.): Supposing an accident occurs costing an amputation in a given month. Is the full time allotted by the National Safety Council for amputation then charged against the individual plant or department for that given month?

Mr. Thalner: That is all in one month's report, because the accident occurred in that month.

EYE INJURIES

DR. L. M. FRANCIS, BUFFALO, N. Y.

I have here a clipping which says, "Twelve hundred accidents to the eyes of workmen occur each year in industry, approximately 15 per cent of the total blind population of the country or 15,000 people represent the industrial blind." That does not mean that there are 15,000 people who have lost one eye. Blindness means both eyes lost. Those statistics and any statistics like them, as large and appalling as they are, have nothing to say about the person who has lost the vision of one eye. These statistics are built upon people who are totally blind. So you see, after all, it is a real problem. It is a tremendous problem.

This question has two distinct phases, it seems to me: one, a human side which it has always had and the other, an economic side which is just coming to the attention of the employer for the reason that the states are passing compensation acts, and whether you will or no, there is a problem for you.

I am not going to deal in the few minutes at my disposal with the question of safety devices, because that belongs to men who know a whole lot more about the situation than I do, but I want to talk for a little while on the question as a practicing ophthalmologist, or eye specialist, and particularly from the man's side of the proposition.

This question has two very distinct angles, one the man's side and the other the employer's side, and they both can be met. They both have a single object, and they both can be met with the exercise of a little horse sense. The first thing is to see that the man is fit for the job and the second thing is to see, if he is fit for the job and is injured, that he gets the proper care. If you can settle those two propositions, you are going a long ways toward reducing these tremendous figures of ocular injuries.

To tackle this first question, how are you going to know the man is fit for the job? The only way to be sure that your man is fit for the job is to test his vision when you take him. You say that is not possible. I am here to contend that it is possible—and to convince you.

HOW TO TEST SIGHT

To find out whether a man has good eyesight is a very simple proposition. All you have to do is to put him a standard distance away from a standard test card and see if he can read it. You will say, "But how about those fellows who can't read?" We can take care of them all right, because we have test objects other than letters. For example, here is a standard test card. I might say in passing these standards are standards the world over. They are arbitrary standards but standards recognized in Buffalo, Cleveland, Chicago, San Francisco, Paris, in Patagonia, or anywhere. They are fixed standards. The letters are built up from geometrical formula and are standard all over the world. If you make a record of a man's vision here today in Buffalo, 20 years from now in London you could refer back to these records made in Buffalo.

The easiest way is to cover one eye and then the other, see the smallest letter which the man can read and indicate it. It takes about five minutes an eye to a man not particularly experienced in examining. It is easier with the man who can read, but a great many of the men you take into the plant can not read letters. All right, if they can't read letters, we find out if they can read numbers; and if they can we get them to tell the smallest number they can read on the card. Some of them are so dumb they can't do that. Consequently we have another way. We speak of an illiterate chart. This particular illiterate chart is a series of E's which point in various directions. Now it is a pretty dumb sort of a man whom you can not get to tell you which way that E points, whether it points up, to the left, to the right, or down. As long as you can get it through his head, it does not make much difference how much ivory he has in it, so that you can get him to start to tell you which way these things go, you have a visual test. There are some who are so thick and so dumb they can't get that through their heads. In that event, we simply tell them to count the number of fingers which they can see and you note the distance at which they see them. They hold up as many as you hold up. You hold up your little finger and tell him to do the same thing. If a man is so thick he can't do that, I don't think you'd better employ him.

The point I am trying to make in the whole thing is that the testing of vision in all classes of labor is an easy and practical thing. If you don't believe it, ask some of the plants here in Buffalo who are doing it. I see Mr. McDonald here. I think he has been converted to this idea. As far as I know every man taken into the Wickwire Spencer Company is first examined so that they will have some idea of what that man sees.

WORKMEN PRESUMED BY LAW TO HAVE NORMAL EYESIGHT

There are two reasons why these tests should be made: first, to be sure that the man has enough vision to take the job you want him to take; and the second one is, of course, if he hasn't enough vision to do what you want him to do, he is not a safe man in that job, because surely, sooner or later, he is going to be hurt and lose an eye, and the employer is going to lose a lot of time and incidentally pay for his injury. From the man's side, it is just plain, ordinary humanity to find out whether the man can see enough to do the job you want him to do. Let me speak for just a moment from the employer's side. Unless you are prepared to show to the contrary, any compensation commission which is going to award damages as a result of visual loss must assume that the man had normal vision when he started to work. I know, and every man who practices in diseases of the eye knows, that a very large percentage of normal people who come to you haven't normal vision. The results of the examinations for the Army showed that. The results of the examinations conducted in the public schools show that. You can take any group of supposedly normal men and find a large percentage of them who haven't normal vision in either one or both eyes, and yet the employer, unless he is in a position to show what the vision of the man at the time he employed him was, pays for an injury based on normal vision, and it is all right and proper that he should.

Don't you see that those laws bring up the issue in a very practical way to the man who is paying the bills, and you always get a little action when you get into the pocketbook? That is why we are much more concerned in the question of visual economics in the year 1923 than we were in the year 1913, and we are going to be much more concerned with it as time goes on, and insurance rates go up for carrying these injuries. So you see there is a very practical side to it.

Don't think that every man who does not have normal vision should be rejected. I am not silly enough to think that, but I do mean if the standard is very low you had better find out about him and see if he is safe in your plant. That is the time the man who employs the labor had better put the man aside and have the plant physician or nurse or whoever makes the examination look into the case a little further.

You may keep a man out of a job for two days, or you may keep a machine idle for twenty-four hours, but suppose you do— isn't it a great deal better and isn't it better horse sense to do that than to put a man at work that he may fumble and endanger his eye-sight in, and certainly slow down production? I think it is much better sense to do that than it is to do it afterwards when the trouble has happened.

You would think it was a pretty poor sort of a business arrangement that would put a one-legged man to trundling a wheel-barrow or a one-armed man into a job where he would be hauling a rope all day; but every day in Buffalo and Pittsburgh you are doing the same thing as far as eyes are concerned. You are putting a one-eyed man in a two-eyed job, a man with very defective vision into a job that requires fine eye-sight, and you grumble because he gets hurt, and the front office swears because production isn't up to standard.

EXAMINATION FOR PRE-EXISTING DISEASE IS NECESSARY

There is another question over and above testing of vision, and that is to be sure that the man has no pre-existing disease. That is a little harder question; it is a question which confuses the expert every once in a while, so I don't expect that the man that employs labor can settle that question, but he can be curious. Any man that he is employing who has red eyes, he had better put him aside and have the plant doctor look him over, see whether he is safe, before he takes him, for two reasons: first, because of the man. A great many of our immigrants suffer with the disease so common in Europe, called trachoma. If you employ a man suffering from trachoma or who has had it a great many years and is not entirely cured and put him in a job where he is exposed to dust and irritation, the chances are ten to one that sooner or later you are going to bring back his trachoma, and he may have a very minor injury, such as a foreign body on the cornea that in the ordinary case might lay off a man for two or three hours or on the outside a day. In that individual case, it will mean a period of illness and disability extending over one month to two months or three months, and if you don't believe it, ask Mr. McDonald about that Mohammedan he had last year on his hands whose name was — —we will call him Ali Baba, because he certainly was, from a compensation standpoint, one of the forty thieves.

- Now, Ali Baba was an innocent youth and strayed out to the Wickwire plant and got a job. They needed a man and took him on. Ali Baba was not any great sheik and I don't know why they took him, but they took him anyhow. They never paid any attention. They said, "What is your name? . . . Your name is Bill. Your check number is so-and-so. Report tomorrow."

He worked two or three days, and then he got something in his eye. He was sent to the first aid, as they do very promptly out there. The first day, they took the foreign body out and sent him back, and he began to weep all over the place. Then they sent him to the plant physician, the eye specialist. That happened to be me. What was the matter with Ali Baba. Not a foreign body? No, no, no. It started up in Ali Baba's very lively trachoma which Ali Baba had in the old country. Ali Baba was off for months. I have a feeling that Ali Baba is not working for the Wickwire people any more. If the Wickwire people have as much good sense as I think, he is not.

It was not fair to Ali Baba, to begin with, to take him on and put him in a dirty job. He was all right in the front office signing checks, but no good where he was, so he lost two months' work and had some awfully sore eyes. I don't believe his visual efficiency was impaired, but that was due largely to his medical attention. (Laughter.) The Company paid him for the time he was having this experience, and I think they paid very properly. I think they got precisely what was coming to them, simply because they didn't use a little horse sense in finding out whether Ali Baba was fitted for the job.

LITTLE INJURIES THE MOST SERIOUS

I want to speak just a moment about eye injuries. If I can drive home this thought, that it is not the major injury that does the damage, it is not the fellow that gets whacked in the eye with a crowbar and who has to have his eye removed—that is not what constitutes this fifteen thousand I read about—if I can do that, I will have made the point I have in mind. It is the little injury, and particularly it is the foreign body on the cornea, that causes the most trouble.

What is the cornea? We think of it ordinarily as the sight. I am not going to give an anatomy lesson here, so you needn't leave, but these are actual facts: the cornea is just as much a structure as the finger. You know what the finger is. The cornea is of a great deal more economic importance than the toe and sometimes the hand; yet when I say cornea you wonder what in the world I am talking about. We will think of the eye as a watch. The white part of the eye corresponds to the watch case. We call that the sclera, but you are not interested in that. The cornea corresponds to the crystal on the watch. The cornea is the most wonderful structure in the human body in that it is a functioning member constantly exposed to irritation and dust and all that, and it must keep clear.

Nature has been rather generous about the cornea. There is more cornea than we use. The average eye uses only a little circle in the center which measures four millimeters. This is the sight of the eye to the workman. Most of the damage that is done is by minor injury to the cornea, and most of the visual losses are the result of injuries to that part of the cornea through which you see, namely, the central part.

A foreign body in the eye around the cornea is one of the most common industrial accidents we have. What happens? You have a very highly organized tissue here that is unprotected except for the occasional sweep of the lid. If a foreign body lands on that cornea, it makes a hole in the cornea first of all, and if it is not very promptly removed, that hole is very apt to get infected.

I heard you talking about infection a while ago. Infection in the cornea means a lot more than infection in the hand, because infection in the hand can close up and be replaced by scar tissue and leave the hand functioning perfectly. That is not true in the cornea. The same process goes on, the loss of tissue is repaired by nature, but not by the same

tissue that was in the cornea before; to take its place, there is scar tissue, the same kind that is put down here in the hand. That is all very nice, but you don't see through scar tissue. That is where the awkward part comes. Scar tissue is cloudy, and for every scar you have on the visual area of the cornea, you have some reduced vision.

If we could only get those who are responsible to regard injury of the cornea as a serious matter, we would be going a long ways to reduce these statistics. Why? Because it is the unrecognized minor injury of the cornea, and particularly of the visual area of the cornea, that reduces vision. Fortunately, many of the foreign bodies are hot and therefore are sterilized. Some of them are not, some are pieces of dust which carry infection right with them. But in the case of a foreign body, if I may call it such, such as a piece of steel or cinder, if it is removed promptly, you are not going to deal with infection, provided infection is not introduced at the time of the removal.

I am not sure that is quite a fair statement, because the lids are always infected. They are exposed to the air. They always carry a certain amount of infection which you never can get rid of, but a great many of these injuries are infected by the fellow who removes them, and that is usually that handy man that belongs to every gang who has a sharp pocket-knife and more nerve than good sense. He backs the man up against the wall, gets a good light and makes a stab at it with his pocket-knife, taking the foreign body out. He is the fellow who is building up these statistics. The foreman says, "I can't spare that man to go to the front office and have his eye tinkered with when I can get old Bill who has always done that sort of thing.

If you will send that man to the front office to the plant nurse and let her take it out with a clean instrument or a piece of cotton and put in an antiseptic ointment and send him back, your insurance rates will be less, and you will have these statistics reduced.

DEMONSTRATES PRE-EXISTING DISEASE

I think these things are driven home if you can only see them. I have brought a man with me this morning who is an example of what I am talking about. I don't mind telling you where this man came from. This is my friend, Mike Sapelwitch, and there are hundreds and hundreds of Mike Sapelwitches roaming about the city today. I have his record here, and here is the man.

On the 24th, while he was working for the American Radiator Company—I won't be rotten enough to tell which plant—he was walking through the drop room, not engaged in his occupation, when something flew in his right eye. I saw Mike on the 28th, and here is what Mike looked like to me. This is the visual area, the business area of the cornea (showing by diagram), an infection dipping right deep into the cornea, edges undermined, a lot of corneal tissue lost, eye full of pus. We rushed him into the hospital. He had night and day nursing for a week or so. We finally got the infection stopped and the healing process started.

Now, here is Mike. Stand up here, Mike. I have not tested Mike, before this. (Making series of tests indicating that vision in the eye which had been infected was almost gone.)

The reason I showed you Mike was because Mike is not an unusual example of what we see. He is a common, ordinary, everyday exhibit to eye men. If Mike had had his original injury down at the side, it would hardly have made any difference because the visual area of the cornea would not have been involved.

On your records, when a case of a foreign body in the eye comes in to the nurse or to whoever has charge, always be sure to indicate where the injury is. That is not a difficult thing. It does not require any great skill. All you have to do on the record is draw a circle which indicates the cornea, and make a mark at the relative position where that foreign body was. If you don't want to do that, you can have a stamp. These stamps cost a dollar, but they are the easiest things in the world to use. Use a stamp or a diagram and indicate on that diagram where the foreign body was, for the reason that these injuries are so common that you don't know whether visual loss is the result of a foreign body in the center which happened, say, six weeks ago, or whether the loss of vision is the result of a foreign body over here (indicating). If your records show that on such and such a day, he had a foreign body in the center of the cornea, you have some basis on which to go.

I believe that the large percentage of visual losses can be prevented by proper safety devices and goggles, and those goggles should be clean. They are cheap compared to what you pay for a lost eye. Just think how many goggles a thousand dollars would buy. It would buy a barrel of them—yes, half a carload perhaps—and yet they kick because you put in a clean goggle once in a while. The men are not going to use goggles that are blurred. You have to keep them clean, and charge it up to operating expense. It is a good deal better to pay for a goggle every little while than to pay for an eye every little while; and then, too, I want to go back to that old phrase, don't put a one-eyed man in a two-eyed job, and if he is hurt, be sure to see that he gets proper and prompt medical attention.

DISCUSSION

Mr. T. H. Murphy: Do the eye tests described show trachoma?

Dr. Francis: No sir. Perhaps I didn't bring that out. These simple eye tests will show only lower vision. They will not show trachoma, but I think it is a safe premise to make that no man should be employed whose eyes are inflamed. If that is the order of the plant we will pick up most of your trachomas.

Mr. Murphy: Is there any test that will show positively that it is trachoma?

Dr. Francis: Only inspection by a person who is accustomed to it.

There is one more thing about trachoma. The man who is afflicted is not safe for two reasons. I forgot my second reason. He is a danger

to his fellow workman because trachoma is contagious. You may have trachoma in your whole plant.

Mr. Thalner: The question arose the other day where a man was brought up who had, according to the chart, a vision of twenty-two hundred in each eye. The man started to argue with me. I gave him one of our papers and asked him to read it; he held the paper up and read it to me just as well as I could read it. I asked him to point out objects on the wall and he told me what they were, but still according to the chart his vision was twenty-two hundred, or we would say, practically blind. Is there any explanation to that?

Dr. Francis: There is an answer to that. What did you want this man to do?

Mr. Thalner: He was going to be put on a stock checking job.

Dr. Francis: You showed a lot of good sense there.

You found out that his distance vision was blurred but his near vision was sufficient. I should say that man was safe. I don't mean to say that every man you take into your plant must be perfect. I say you must have a record of what you are working with.

Mr. King: You spoke of a severe blow to the eye. We had a slight blow from a loop wire. The man was sent to our company surgeon. Inside half an hour the doctor said that apparently there was no injury to the eye, nothing in the eye, not a puncture. In two or three days severe inflammation was developed and again the doctor saw him and that time sent him to an oculist. That man has lost the sight of his eye, and probably will have to lose the eye. Did we handle that correctly?

Dr. Francis: I think so. I mean to say that you exercised a reasonable precaution; that is all that can be expected. No man's judgment is infallible, even a doctor's. Of course, my natural impulse is to say, and I have not said it yet, that every plant ought to have an eye man in whom they have confidence and who can guide them through these troubles. I think perhaps that is going a little too far. The time will come; it is not here yet. I would advocate it and urge it. I think the money that is spent in getting good advice is well spent and does not show on the red side of the ledger at the end of the operating year.

REPORT OF NOMINATING COMMITTEE

Mr. Shaw: We recommend as chairman of this progressive section, Mr. L. E. Averill of the Oakland Motor Car Company, Pontiac, Michigan. For vice-chairman, Mr. Cotcher, who is a new man to me. I had the pleasure of meeting him yesterday. As secretary, Mr. Thalner, the young gentleman who read the paper and led the discussion so capably.

I think the exhibit is going to grow and we suggest that we have a special chairman for carrying on this work. Mr. Kuechenmeister.

In addition to this we would suggest the past chairmen act as an advisory committee.

The report was adopted.

DISCUSSION OF DROP FORGE HAZARDS**LED BY THOMAS IRVING, DETROIT, MICH.**

Mr. Irving: The subject of the tentative code for drop forge hazards, in my estimation, is one of the most important discussions yet presented, for the reason of the attendant natural hazards, such as the hot metal. The immense force represented in your equipment, the resultant vibration, crystallization and breakage, the live steam, the fuel oil furnaces, etc.—they are a few of the hazards which exist in the forge shop over and above the hazards met in other branches of our industrial activity, and I hope when we get through with this code we will be able to consider it as a hand-book for the forge shop; in other words, a bible which we can abide by and base our decisions on along the safety line for future use.

Mr. Irving then read various paragraphs of the code.

Mr. C. E. Lehr (Bethlehem Steel Co.): I should say an aisle width of four feet six inches was rather small. In a great many drop forge plants they handle machinery such as a light electric truck, if the aisles are made wide enough, and I am pretty sure four feet six would not permit the negotiation of a machine at all. If it is simply a passage-way for a wheel-barrow or something of that sort, it is all right.

Mr. Clark: It seems to me that the environment in which drop hammer plants are frequently placed is going to be the arbiter as to how much room you have. Frequently you have to utilize the space that is available, and in laying out a new plant, it appeals to me that the recommendation of the committee should be the factor considered.

Mr. J. A. Dickinson (Bureau of Standards): I would suggest that in addition to specifying minimum width, as we have, we put in another clause to the effect that the aisle should be wider where large machines will run. In other words, bring out clearly the idea that it is the minimum, and in many cases wider aisles would be preferable.

Mr. G. E. Peterson (Travelers Insurance Co.): Possibly the criticism of the existing minimum lies in the fact that it does not take into account whether a plant uses electric trucks or other means of conveying material by means of mechanical power. Perhaps you could overcome this objection by establishing a minimum for plants using trucks of that kind and leave the existing minimum. Of course, the thing is a minimum and is so understood. For the smaller plants, four foot six would probably be sufficient.

ADJOURNMENT.

Joint Meeting of Chemical and Rubber Sections

October 2, 1923

S. H. KERSHAW, Chairman, Chemical Section
Hercules Powder Company, Wilmington, Del.

E. W. BECK, Chairman, Rubber Section
United States Rubber Company, New York City

CHAIRMAN KERSHAW: About a year ago, one of the member companies of the Chemical Section came to us and said it had had considerable trouble with benzol poisoning. They thought it would be a good thing for the Chemical Section of the Council to investigate the subject.

The first action that was taken was in the form of papers prepared by Mr. Horan, Mr. Paine and others. These were presented and discussed at the last Congress and proved to be unusually interesting. Several of the members present urged that we appoint a committee immediately and start a thorough investigation. As a result of that recommendation a sub-committee of our industrial poisons committee was appointed, with Doctor Winslow as chairman. From all appearances, this committee has done a remarkable piece of work. Unfortunately, Doctor Winslow is unable to be with us this morning, but Mr. Horan who has done much of the detailed work in connection with this investigation will present the report.

PROGRESS REPORT OF COMMITTEE ON BENZOL POISONING

INTRODUCTION

At the 1922 National Safety Congress in Detroit papers and discussions on benzol poisoning were presented by Mr. Chas. F. Horan and Mr. W. S. Paine, which papers aroused so much interest that the industrial poisons committee of the Chemical Section was specifically directed to undertake a study of the question. Mr. A. L. Watson, chairman of the industrial poisons committee in the spring of 1923 appointed the undersigned as a special sub-committee to study and report on this important question. The committee was finally organized in March and has held two meetings—on April 6 in New Haven and on September 21 in New York City, and as will be indicated below, the individual members of the committee have

been actively at work on the subject throughout the year. The problem is a large one and the committee feels that its work is only begun, so that the following report is to be considered merely as a report of progress.

THE LITERATURE OF BENZOL POISONING

It was felt that our first step should be to arrange for a thorough survey of the information at present available in printed form and Dr. J. W. S. Brady, a member of the committee, was good enough to undertake this task. Dr. Brady has prepared an exhaustive bibliographical review of the subject, which is presented in full in an appendix to this report.

Benzol: Benzol is a pure hydrocarbon obtained from the distillation of coal tar and from the strippings of coke-oven gas. It was not much used before 1910, but production, expanded to meet war needs, has now made it readily available and comparatively cheap. It is an excellent solvent for organic material.

Industrial Uses of Benzol: Except where it is used in the manufacture of chemicals and explosives, burned as motor fuel, in illuminating gas, or in welding, benzol is used chiefly as a solvent—mainly as a rubber solvent for cementing in the manufacture of rubber goods, tires, hose, footwear, garments, gloves and in the sealing of cans. It is used in the making of artificial leather, linoleum and straw hats. It is used in painting—either in tar paints, or as a “thinner” or varnish remover. It is used as a solvent for cement in can making, in shoe manufacture, in extracting fat from bones and in dry-cleaning processes.

Kinds of Benzol: Besides pure benzol and toluol and xylol, there are several kinds of commercial benzols, these containing toluol, xylol, thiophene, and, rarely, traces of carbon disulphide. The usual commercial products are:

PURE BENZOL—a clear colorless liquid of a characteristic odor.
B. P. 79.7° C.

NINETY PER CENT BENZOL—So called because in the distillation 90 per cent distills over at a temperature less than 100°C. It is composed of 80-85 per cent benzol, 13-15 per cent toluol, 2-3 per cent xylol, and sometimes contains as impurities traces of olefins, paraffins, sulphuretted hydrogen and other bodies.

FIFTY PER CENT BENZOL—This substance contains 50 per cent of constituents which distill below 100°C, and 90 per cent below 120°C; it is a very mixed product, with only 40 to 50 per cent benzol.

SOLVENT NAPHTHA—This material is called solvent naphtha because it is used extensively (especially in England) for dissolving rubber. It is relatively free from benzol, and consists largely of xylol.

It seems generally accepted that pure benzol is more poisonous than the other grades referred to.

Susceptibility: A great variation in the individual susceptibility appears to be well established. Women and children, as well as individuals of deficient eliminative powers are affected more easily. Atmospheric conditions of temperature and humidity seem to affect greatly susceptibility.

Absorption: Entrance of benzol into the body occurs chiefly through the lungs. Eighty per cent of inspired benzol is absorbed by the body, less than one-half of which is recovered in six hours. Skin absorption is slight. Given by mouth in the treatment of certain blood conditions, doses up to three grams a day have been tolerated for a considerable period. (As a remedy it is at present little used.) It is excreted through the lungs, or as phenols in the urine.

Action: The action of benzol is anesthetic on the nervous system, and destructive of blood and fat. Doses as small as 0.02 to 0.05 parts of pure benzol per 1,000 parts of air in animals affect the cardiorespiratory nervous centers, and produce delirium and death. Small doses, long continued affect the nervous system, the blood and blood-forming organs. The white cells, especially those formed in the bone marrow, are destroyed. Platelets disappear. Coagulation and viscosity are effected. Immune bodies and antibody production are depressed. Red cells are destroyed. Recovery is slow.

Post-Mortem Pathology: Post-mortem pathology in acute cases shows cyanosis, fluid blood, minute hemorrhages from skin and mucous membranes, and the presence of benzol in brain and tissues. In chronic cases the picture is that of non-regenerative anemia with purpuric spots and hemorrhages, and fatty degeneration of the bone marrow and organs.

Symptoms of Poisoning: Faintness, dizziness, breathlessness, rapid pulse, cyanosis or lividity, and sudden death, preceded at times by acute mania or delirium, in acute poisoning and in chronic poisoning, gastrointestinal symptoms, anemia, reduction of white cell count, especially the polymorphonuclears; reduction in red cells with increase in coagulating time of blood; neurasthenia, hemorrhages from various mucous membranes, purpuric spots on the skin: Local action sometimes produces irritation and dermatitis. Numbness, pallor, parasthesia of exposed fingers is common.

Diagnosis: The diagnosis of benzol poisoning is made by history of exposure, plus gastro-intestinal symptoms, anemia, hemorrhages, purpura, increase in coagulating time of blood, reduction in both red and white blood cells. The reduction in numbers of white cells is especially characteristic of benzol poisoning.

Treatment: Immediate, absolute rest and absence of any effort; fresh air or oxygen; prolonged convalescence, in acute poisoning and chronic cases, if mild, recover on removal from exposure with treatment of fresh air and iron tonics. Cases with purpura or hemorrhages require repeated transfusions and blood-building food and tonics.

PRELIMINARY STUDY OF EXTENT OF BENZOL HAZARD

In order to obtain a preliminary idea of the extent of the problem as it exists in American industry today an incomplete preliminary list was prepared of 324 industrial establishments which, from the nature of their products, might be expected to use benzol. Through the courtesy of Mr. W. S. Paine of the Aetna Life Insurance Company a questionnaire was sent to this list of industrial establishments in July and to date 140 replies have been received. Of these 56 replied that they did not use benzol in any form, leaving 84 firms who do make use of this substance. Some idea as to the amount of benzol used by the firms replying to our questionnaire may be gained from the following figures: Thirty-six replies gave no definite information in regard to this point. In 19 cases the amount of benzol used was insignificant; in 6 cases it was between 5 and 25 gallons per week; in 4 cases between 26 and 99 gallons; in 10 cases between 100 and 500 gallons; in 3 cases between 501 and 999 gallons; in 6 cases over 1,000 gallons—reaching the very high figures of 2,200, 3,000, 75, 8,000, 10,000, and 30,000 gallons per week. The six largest users included three rubber companies (8, 23 and 25) and three large chemical concerns (13, 24 and 19), one of the latter is principally concerned with the supply of products for the making of can seals. It is interesting to note that out of 15 companies reporting cases of benzol poisoning only 2 are among those using less than 100 gallons of benzol per week; 4 were among those using between 100 and 1,000 gallons; 3 were among the six firms using over 1,000 gallons; while 6 were among the 36 firms giving no information as to the amount of benzol used.

A more helpful analysis from our standpoint deals with the number of employees exposed to possible toxic effects of the benzol. We have this information reported for 67 firms, 73 industries having failed to state the number of employees exposed in processes where benzol constitutes a hazard. The general results are indicated in the table below with comparative figures showing the number of firms in each class which reported having experienced cases of benzol poisoning.

TABLE I

Number of employees exposed to possible benzol poisoning

	0-4	5-9	10-24	25-49	50-99	100 and over	no information
Number of establishments in each class.....	30	14	10	7	2	4	73
Number of establishments reporting cases of poisoning	3	1	3	3	1	4	

Out of 23 establishments with 10 or more employees exposed to benzol poisoning 8 were rubber factories, 5 were chemical works, 4 were paint and varnish makers, 3 were gas plants making benzol as a by-product, and 3 were plants of other types.

It will be noted that out of 44 establishments with less than 10 employees exposed to benzol poisoning only 4 reported as having experienced cases of poisoning. Of 17 firms with from 10 to 49 employees exposed, 6 had experienced cases of poisoning, while of the 6 firms with more than 50 persons exposed to benzol all but one had experienced industrial poisoning by benzol. It is suggested that facilities for the diagnosis of benzol poisoning may influence statistics such as Table I presents, and that full-time physicians in large industries may naturally be expected to diagnose cases of industrial poisoning more frequently than persons who are not familiar with the symptoms of such poisons.

We present in Table II the more important data with regard to 33 individual industries whose reports seemed of special interest for one reason or another. The table includes (a) all plants reporting cases of benzol poisoning (b) all plants reporting the exposure of 10 or more employees to the possibility of benzol poisoning and (c) all plants reporting the use of 500 or more gallons of benzol per week. The plants are arranged in order according to the number of employees exposed to benzol and are identified by arbitrary key numbers, since the information obtained in this study was in many cases of a confidential nature.

TABLE II
Data With Regard to Establishments Where Benzol Hazard May Exist.

Key No.	Product	Gallons of Benzol used per week	Number employees exposed	Poisoning Cases	General Precautionary Measures Used
8	Rubber Goods	2,200	1,080	Yes	Ventilation.
21	Rubber Goods		150	Yes	Ventilation.
9	Rubber Goods	525	100	Yes	Closed containers, ventilation.
15	Chemicals		100	Yes	Closed apparatus, ventilation, helmets, partial elimination of benzol.
5	Rubber Goods	100	50	Yes	Ventilation, medical examination.
26	Celluloid, leather, cloth		50	Yes	Local ventilation, medical examination.
27	Japanned goods	60	35	No	Ventilation.
6	Gas by-prod.	500	32	Yes	
25	Rubber Goods	7,500		No	Closed containers, ventilation.
23	Rubber Goods	8,000	30	Yes	Closed containers, ventilation.
28	Rubber Goods		25	No	Limiting Use of Benzol.
29	Chemicals		25	No	
17	Chemicals		25	Yes	Closed containers, ventilation.
30	Rubber Goods	25	25	No	
31	Gas by-products		20	No	Closed containers.
38	Paints and Varnishes		20	No	Ventilation, closed containers.
32	Cans		18	No	Local ventilation.

TABLE II—Continued
Data With Regard to Establishments Where Benzol Hazard May Exist.

Key No.	Product	Gallons of Benzol used per week	Number employees exposed	Poisoning Cases	General Precautionary Measures Used
11	Paints, Varnishes		15	Yes	Respirators.
33	Gas by-products		13	No	Closed containers, ventilation.
20	Rubber Goods	25	12	Yes	Local ventilation, rubber gloves.
22	Vegetable Oils		12	Yes	Medical examination education.
34	Chemicals		10	No	Closed containers, ventilation.
35	Paints, Varnish	250	10	No	Education.
10	Chemicals		10	No	Closed containers, care in cleaning tanks.
19	Can solvents	10,000	8	Yes	Ventilation.
24	Chemicals	30,000	7	No	
36	Chemicals	750	4	No	Closed containers, ventilation.
37	Benzol used in cutting asphalt	700	4	No	Closed containers, low temperatures.
13	Chemicals	3,000	4	No	Closed containers.
12	Paints, Varnish	150	3	Yes	Change of employment.
7	Rubber Goods	5	3	Yes	Ventilation. Limitation of use of benzol.
16	Motor Fuel		2	Yes	
13	Coal tar distil.			No	

We may now pass to a more detailed consideration of the difficulties experienced by the reporting firms in regard to benzol poisoning. It will be noted that of a total of 140 firms reporting, 56 used no benzol and 19 used it in very insignificant amounts. This leaves 65 firms using an appreciable amount of benzol (where any information was available, at least five gallons per week). Of these 65 firms, 15 have noted cases of poisoning. The information submitted by these companies may be summarized as follows:

Firm 5—A rubber company using about 100 gallons of benzol per week with about 50 employees exposed. Four fatal cases occurred in earlier years, but at a time when the use of benzol was greater than at present. Experiments are now being made with a carbon tetrachloride-rubber cement to replace the present benzol. Three of the four fatal cases were among cousins, and all cases occurred in the spring. The principal symptoms noted were anemia, purpura and hemorrhage, blood changes. There were no instances of sudden acute shock.

Firm 6—A gas company producing benzol as a by-product. About 500 gallons a week are handled and 32 men exposed. During 12 years operation three or four men have been temporarily overcome by fumes and in one department where benzol fumes are sometimes liberated men have experienced some gastro-intestinal symptoms.

Firm 7—A rubber company using only 5 gallons of benzol a week for cement in certain processes. Three men are now exposed. In the past when benzol has been used more extensively, those who were exposed constantly complained of weakness, headache and pains in the eyes. They had a form of intoxication which largely passed off over night. One case exhibited these symptoms in very marked form, others in a slighter degree.

Firm 8—A rubber company using about 2,200 gallons of benzol per week with 1,080 employees exposed. One woman worker collapsed but was revived in a few minutes in the open air.

Firm 9—A rubber tire company using about 525 gallons per week, 100 employees being exposed to possible poisoning. One employee suffered from hemorrhages from the nose and was relieved by removal to another department.

Firm 11—A paint company with 15 workers' exposed to possible poisoning. One case of sudden collapse.

Firm 12—A paint and varnish manufacturing establishment with about 100 gallons of benzol used per week. Three employees are exposed to possible poisoning. No poisoning is reported, but skin irritations have been noted. Symptoms relieved by transfer to other work.

Firm 15—A large chemical plant where about 100 employees are in processes where benzol is used. Two fatal cases in artificial leather coating department in the spring of 1920 and one fatal case in the same department in the spring of 1922. Has experienced several cases of nose-bleeding in employees of coating department, and symptoms have cleared up with change of work.

Firm 16—Manufacturers of benzol-blend gasoline motor fuel. Two employees exposed. Nervous disturbances and neurasthenia have been noted and the firm has at times been considerably worried as to the situation.

Firm 17—A chemical company in which 25 men are employed in benzol processes. Some five or six years ago a definite case of benzol poisoning occurred from special unusual exposure and during the past year another worker gave some indication of gastro-intestinal disturbances.

Firm 19—A chemical corporation making benzol products for use in the making of can seals. 10,000 gallons of benzol used each week, and 8 men exposed to possible poisoning. Has experienced no cases of poisoning among its own employees, but has had several cases of probably acute benzol poisoning reported by users of its products.

Firm 20—A rubber company in which 25 gallons per week of benzol is used, 12 workers being exposed. One or two cases of poisoning have occurred with symptoms of anemia, gastro-intestinal disturbances, dizziness, and cracking of the nails and skin of fingers.

Firm 21—A rubber company with 150 employees exposed. Two years ago cases of poisoning occurred but lately improvements in ventilation and abandonment of impregnation processes have eliminated the trouble.

Firm 22—A firm using benzol for the extraction of vegetable oils. Twelve workers exposed. One foreman was overcome after entering the storage cellar when a valve had broken.

In addition to the experience reviewed above we may cite the statement of a firm (2) which in the past has handled benzol in connection with the manufacture of oils and chemicals that poisoning troubles experienced in the past have been eliminated by the substitution of toluol for the benzol. The chemist of this company writes:

"While we have not made exact experiments to support this opinion, we have ascertained that pure benzol gives considerably less trouble than the ordinary commercial grades. In the few cases where we use benzol we employ the pure product exclusively with very good results." (Committee Note: This opinion appears to lack uniformity with the proceeding paragraph.)

Another company (4) writes: "Recent developments in the industry are such that within the next few months we confidently expect to entirely eliminate the use of benzol if experimental work on another solvent has proceeded far enough to strengthen our belief that it will be a successful substitute."

The representative of another company (18) writes that while they do not use benzol at present he personally appreciates the effects of benzol poisoning since he was laid up for about two days at one time with extreme nausea and headache as the result of handling this substance. It is of some interest to note that three companies (1, 3 and 10) manufacturing or distributing large quantities of benzol report no complaints from customers in regard to poisoning since the war.

Finally we may consider the special precautions reported by certain of the firms responding to our questionnaire. It should be noted that the following are precautions reported to the committee and should not be considered as recommended by the committee. (The recommendations of the committee are considered in part V of this report:)

- (a) The use of enclosed apparatus for the handling of benzol.
- (b) Special precautions in handling benzol so as to minimize exposure to the atmosphere.
- (c) The use of special exhaust ventilation at points where benzol must necessarily be exposed.
- (d) Ample ventilation of the general occupied spaces where benzol is handled.
- (e) The handling of benzol so far as possible at low temperatures.
- (f) The use of special protective breathing apparatus.
- (g) The use of rubber gloves.
- (h) Systematic medical examination.
- (i) Education of the worker in regard to the dangers of the process.

Of the 140 firms using benzol replying to our questionnaire, 42 specify protective measures of one or another of the types indicated. Of the 23 establishments in which 10 or more persons are exposed to benzol all but three report special precautions. Among the most detailed statements in regard to this point may be mentioned the following:

Firm 5—Physical examination with frequent re-examination of all exposed employees. General room ventilation by downward draft in all rooms where benzol is used.

Firm 9—Very complete ventilation to remove fumes. "We keep liquid in covered containers at all times."

Firm 10—"We believe that the chief hazard in working about benzol is to safeguard men in cleaning tanks which have contained benzol. Our procedure is as follows: Steam out tank, then fill in with water to displace all gas. We do this as often as necessary, then allow a man to enter the tank with a rope round his waist and an attendant watching him constantly."

Firm 13—Benzol is used only in closed containers (for sulfonation) and delivered by compressed air. Fumes are condensed from sulfonators into the open.

Firm 17—"We aim to handle benzol only in a closed system with further precaution of very ample ventilation in order to eliminate any hazards which may be present."

Firm 19—"We change the air every few minutes by ventilation."

Firm 20—Specially designed hoods with downward ventilation are provided. This has been found very effective in the elimination of fumes from pre-forming processes and cementing tables. Fountain type safety cans for moistening sponges are provided and rubber gloves are used.

Firm 22—The company doctor and chemist have reviewed American and German literature on benzol poisoning. The company doctor has drawn up rules for first aid treatment, a copy of which is on the inside cover of the box containing the drugs he prescribes. The rules for the use of these drugs were explained to the manager, superintendent, chemist and each of the three foremen, and instructions were given as to the symptoms of chronic poisoning.

PLANS FOR THE FUTURE

The results of our questionnaire taken face value would appear to suggest that the industrial firms using benzol are keenly alive to the possible dangers involved and in most instances have taken very definite precautions for the protection of their employees. It would appear that the number of acute cases of benzol poisoning is not large, but it is obvious that cases of mild chronic poisoning may often occur without detection.

Furthermore it may be noted that out of 23 establishments in which 10 or more persons are exposed to possible benzol poisoning, 11 or nearly half, report cases of poisoning, while of 6 plants in which 50 or more employees are exposed, all but one report poisoning.

The principal purpose of our questionnaire was to obtain some idea of the particular industrial processes and the particular plants in which the dangers of benzol poisoning were most considerable. If the committee is to be continued we hope in the future to make a more detailed study of those industries where the hazard seems to be most serious and to report more fully at a later date in regard to the extent of the hazard and the most effective means of controlling it.

TENTATIVE RECOMMENDATIONS

Meanwhile the committee recommends the following precautionary measures as a means of preventing poisoning by benzol in processes where this material constitutes a hazard:

1. The use, where possible, of enclosed apparatus for the handling of benzol.

2. The use of special exhaust ventilation where employees are exposed to the fumes of benzol:

(a) Where benzol is evaporated at room temperatures, air removal by general room ventilation with down draft is recommended, although in certain enclosed processes where negative pressure can be applied, direct ventilation (from the enclosure) with upward draft may be indicated.

(b) Where localized heat is applied in the evaporation of the benzol, hoods or enclosures should be provided with up-draft. This draft should be sufficiently intensive and applied so closely to the point of origin of the evaporating benzol to insure the complete removal of all of the benzol before the heated surface is removed from the hood or enclosure. This recommendation deals with specific processes where sufficient upward air movement is created by the heated surface to overcome the natural density of the benzol vapor.

3. The use of special exhaust ventilation for tank cars and other containers together with the use of special protective breathing apparatus in the cleaning of tanks and other enclosed spaces where benzol may constitute a hazard. The committee does not recommend the use of ordinary commercial respirators as a means of preventing the absorption of benzol fumes.

4. Physical examination of all new employees with the object of excluding from benzol processes applicants suffering from:

(a) Organic diseases of heart, lungs or kidneys.

(b) Hemorrhagic tendencies.

(c) Anemia or any unusual blood picture.

5. Frequent re-examinations of all employees exposed to benzol and the temporary exclusion from benzol processes when examination reveals the presence of:

(a) Hemorrhages from the mucous membranes of the nose, mouth or other organs.

(b) Decrease of more than the following from the employee's normal blood picture (normal conditions will be obtained from previous examinations of the individual employee):

(1) White cells, decrease of 25 percent; but in no case should an employee with a white cell count of less than 5,000 be continued in benzol processes.

(2) Red cells, decrease of 25 percent.

(3) Haemoglobin, below 70 percent.

(Note: Reduction in white cells is the most important condition to be noted. Still more delicate and specific is the change in ratio of the various types of white cells.)

6. Investigation of absences from work by persons familiar with the symptoms of benzol poisoning.

7. Detailed record of the results of physical examinations, duration of symptoms and treatment of illnesses.

8. The employee should be made acquainted with the symptoms which demand early medical attention.

9. A liberal policy of inter-department transfers for employees presenting minor symptoms of acute benzol poisoning.

Respectfully submitted,

J. W. S. Brady

H. Bradshaw

C. F. Horan

W. S. Paine

L. E. Weber

J. M. Weiss

C.-E. A. Winslow, Chairman.

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DISCUSSION

Mr. Horan: Under "Kinds of Benzol," the committee has pure benzol, 90 percent benzol, 50 percent benzol, and solvent naptha. There is another type of benzol, but not a common commercial brand, "100 percent benzol." A lot of us would assume that 100 percent benzol would be 100 percent

pure. That is not so. 100 percent benzol is a solvent that contains 100 percent of materials which distill under 100 degrees centigrade. It isn't the same as pure benzol.

The committee got up a questionnaire which was sent to 324 industries which, from the type of their product, might be expected to use benzol. One hundred and sixty, I believe, have answered the questionnaire. It will be noted that out of 44 establishments with less than 10 employees exposed to benzol, only 4 reported cases of benzol poisoning, in other words only one-eleventh; of 17 plants with from 10 to 49 exposed, only 6, or practically one-third reported benzol poisoning; while of the six firms with more than 50 exposed, all but one reported cases of benzol poisoning.

I think that is of importance. My personal opinion (I don't want to be quoted as speaking for the committee) is that the reason for the high percentage of industries with more than 50 employees reporting cases of benzol poisoning was because of the fact that the people in those industries were more apt to diagnose properly the cases of benzol poisoning.

These statistics are presented by the committee for what they are worth. The committee doesn't believe, I think, that out of 44 establishments with less than 10 employees, only 4 had cases of benzol poisoning.

I hope you will appreciate that this is a very tentative report of progress. The committee feels that quite an investigation on benzol poisoning might well be made. It would be interesting to know just what the dangers from benzol are. There seem to be three opinions with reference to benzol poisoning. One group believes benzol should not be used under any conditions in industry. The second group feels benzol is not particularly dangerous. The third group feels that, to individuals who are susceptible to benzol poisoning, benzol is quite a severe hazard.

Mr. A. L. Watson (Hooker Electro Chemical Co.): I should like to express my personal appreciation to Dr. Winslow and the others on the committee on benzol poisoning for the most conscientious investigation I have ever seen conducted by any committee with which I have been connected. The report which has been prepared by them is a work of art and represents an enormous amount of work on the part of the committee. If my successor as chairman of the Industrial Poisons Committee should see fit, I would like to see this committee continued, to bring out further valuable information.

I will make the motion that this meeting go on record as extending its thanks and appreciation to the Benzol Poisoning Committee for its splendid work.

The motion was seconded and carried.

Dr. Alice Hamilton: I want first to congratulate the two sections on this admirable piece of work. I don't think I have ever seen anything come from industry itself that at all equals the study you have made. I hope it is going to impress you all in that same way, so that you will feel, although the ground covered is very crude, the results covering this ground are gratifying enough to make you want to explore further, for

I am sure the members of the committee will tell you they have not finished their job. I think Mr. Horan intimated as much. There is quite a little yet to be done and I hope they will keep on with it.

BLOOD TEST IS USED

The points that seem to me to remain to be done, I could perhaps illustrate by describing a small piece of work in which Harvard Medical School participated, the year before last, in an artificial silk factory in Boston, where tetrachlormethane is used and a case of mild poisoning developed. It so happened one of the members of the company had interested himself in the study of tetrachlormethane. During the war it was known as "dope" poisoning. In England, they had some 80 or 90 cases in aeroplane factories. They finally got rid of them. It was a toxic jaundice which brought about acute yellow atrophy of the liver.

This appearance of a mild case of jaundice in this man's factory caused him to come to us at Harvard and ask what we could do about it. We made a few suggestions as to the best safeguard against this escape of fumes, but you practical men all realize how impossible it is to keep the air uncontaminated from this dangerous poison. We suggested that they put in a well-trained young physician and have him make routine examinations of as large a group of employees as possible to see if there was not some sign which could be determined upon to show the first stage of poisoning before any serious effects of the jaundice on the liver.

He found the test of the urine showed nothing. But, with the blood test, something did happen; that was the appearance of an unusually large number of leukocytes. Anything over 12 percent was regarded as abnormal and in some cases it reached 30 or 40. In no case did the clinical symptoms occur in this plant without this change in the white blood corpuscles. In four cases that were found without clinical symptoms, they defended themselves against the poison and after the initial stage of showing the change, came back to the normal blood count, indicating that their systems had adjusted themselves to the poison. You don't have to make the white blood cell count; just make the differential. It can be done quickly. It shows when an employee must be temporarily suspended.

If something of that sort could be done in plants with a large number of employees exposed to small quantities of benzol over an appreciable period of time, I believe we could establish a test which would enable us to know when a susceptible person is beginning to feel it.

Of course, with benzol as with all poisons, the individual's susceptibility is an enormously important factor, the same as with wood alcohol. So that I think it would be a very good thing if this committee could find some factory which would allow such a study to be made and could perhaps take that as part of its next year's program.

Mr. Sydney Ashe (General Electric Co., Pittsfield): We were very fortunate the early part of this year in having Dr. Hamilton make inspection of the Pittsfield Works, and she called our attention to a good many of these facts in connection with benzol.

Since then, we have been making as thorough a study as we could of it. We will be very glad to do anything we can to cooperate with the committee. I notice you would like to get some specific data on the incipient cases in the earlier stages. We would be very glad to help you out in this respect.

There is one process in which we use benzol that is giving us a great deal of concern in finding a substitute. We paint the inside of large transformer tanks with paint that contains benzol. We thought out a good many ways of ventilating these tanks such as using compressed air, but so far we haven't found anything practical. We are trying to find a substitute for benzol in the paint. We would rather use benzol if we could.

A METHOD OF PAINTING SMALL INTERIORS

Mr. Horan: Dr. Legge of Great Britain told of some of the work they had done on benzol. He found in painting small interiors where the work could be done fairly quickly, if you began painting at the bottom and came up, rather than at the top and go down, you would find your employees did not breathe as much benzol vapor because of the fact that the benzol vapor would be below his breathing surface, on the way up. If you begin at the top and go down, you are gradually getting more concentrated vapor in the air. Possibly, a portable ventilating system that would take the air from the bottom of the transformer (assuming that the inside of the transformer is of room temperature or cooler) might do the trick.

Mr. Ashe: Those tanks are pretty large, some 10 feet in diameter.

Mr. Horan: Have you tried carbon tetrachloride instead of benzol?

Mr. Ashe: We are trying to get a substitute paint in our laboratories.

Mr. Horan: I notice that in these new shoes with the rubber soles, some of the rubber companies have found that a rubber cement made from naphtha and rubber wouldn't hold the rubber onto the shoe. They have had to use benzol because there wasn't anything else that could take its place. I know of two factories using carbon tetrachloride cement. It has the disadvantage of being a lot more expensive—much less expensive, however, than fatal cases of benzol poisoning.

Mr. W. R. Webb (Eastman Kodak Co., Rochester): What about toluol, xylol? They are less toxic, I believe.

Dr. Sawyer: Mr. Horan has spoken of the possible advantage of using carbon tetrachloride rather than benzol. I have had some rather drastic experiences with carbon tetrachloride used where it is not possible to secure good ventilation. The symptoms are very real. The workers will complain of headache and nausea. I know of a good many cases working around carbon tetrachloride, where the solvent had to be changed. That is particularly true where it is used in wiping joints and that type of thing. From reports in the Journal of the American Medical Association, where they are using carbon tetrachloride to get rid of hookworm, they have had four fatal cases.

Mr. C. E. Rice (Dow Chemical Co., Midland, Mich.): We manufacture carbon tetrachloride. I want to emphasize the last gentlemen's remarks. Carbon tetrachloride is a concentrated vapor and one of the most rapid anaesthetics I know of. I would warn you against it as a solvent.

Mr. M. L. Champion (Clairton By-Product Coke Works): In the manufacture of benzol at the By-Products Works, the workers cleaning tanks come in contact with much more benzol than those who use it in painting. We found the only way to overcome its effects is the use of gas masks. We have a few hose type masks which pump fresh air into the tank through the hose.

Chairman Kershaw: Which did you find best?

Mr. Champion: The hose type is the best. The men like it better. They have more confidence in it. It is just the ordinary face mask with a hose (about 50 feet) attached. The benzol mask would only last thirty to forty-five minutes. We get these nose masks from a company in Pittsburg.

Chairman Kershaw: I see Mr. Paine sitting over here. He has been very prominent in this work ever since it was first brought to our attention.

THE HOSE MASK

Mr. Paine: I would like to speak on this hose mask. We did not believe it would work, so we wrote to the company and asked them to send us the mask. We got a couple of physicians who had been doing special research work. After submitting the mask and hose to rigid tests, we finally put 50 feet of hose on the masks and were then in position to recommend it to one or two of our clients who had requested help on this problem.

So, if you have this problem, Mr. Ashe, I would get in touch with this company and get them to let you try it out and if it stands your tests, as it has ours, it will fill the bill.

I want also to follow along the line that Dr. Hamilton mentioned. You have got to drop a bomb to get anything started and started right. We are just skimming over the surface and the amount of material that has been turned out on industrial diseases and exposure of employees to the intoxicating poisons, etc., has been, in a large measure, superficial except on the part of some physicians who have been sacrificing time and money and have had no backing. Once the bomb is dropped, you begin to see people wake up and say, "Maybe there is something in this," then you begin to find out how little physicians know about it, and how little chemists know about it.

We called a meeting of the best chemists and what we thought were the best physicians on this subject, and began inquiring. They all stood with blank eyes as we began to unfold the symptoms we found in these different cases which had become intoxicated by this special poison of benzol.

Some time last year, after one plant had lost three girls, and it was decided to get the best aid we could, we got the opinions of the best

authority in reach but they were very vague and not in any form to take before a commission and settle something upon which hangs the destiny, not only of a score but many scores. We finally got a specialist and he said: "These are the earmarks of the poisoning."

We began to ferret out these cases. We buried three and found quite a number that were affected. Then I called for an investigation.

We have only touched the edge of this thing. I am not going to scare any one. The road looks brighter, but I am not in agreement with the sect that says this is non-essential, nor on the other hand, the sect that says this is a deadly poison that should be taken out of industry.

Now in that plant which had had 70 cases, with a change of ventilation we haven't had a case.

We have started three or four investigations along the lines laid out by Dr. Hamilton. The thing we are looking forward to next year, if you see fit to carry it on, is to carry this strongly into all the industries. The first thing we have to do is to work out a simple method of procedure on these tests so that as these are followed out in the various plants, next year when the report comes to you it won't be so voluminous as this because we shall have facts. What we state, we will state more carefully, more scientifically and with more evidence to back it up.

As far as the use of tetrachloride is concerned, I have positive evidence that in some cases, for painting, as you suggested, Mr. Ashe, I wouldn't use it. During the war, we labored and labored with that same problem.

Mr. C. N. Young (Globe Indemnity Co.): The matter of protective breathing apparatus in the report is rather conservative. From it, and the discussions here, I gather there isn't very much confidence in any of the chemical types of masks. It seems to be the consensus of opinion that the type of applying external air or oxygen from the container, is the only type on which real dependence can be placed.

I would also like the opinion of the medical representatives here on xylol and toluol. Are they really less poisonous, as this report would seem to indicate, or is it merely the fact that they have a higher boiling point? Is it not a fact that the vapor in so far as it exists at the same concentration is more poisonous than the fumes of real benzol? I would like discussion on some other substitutes used in industry, for instance tetraethylene.

RELATIVE TOXICITY OF BENZOL, TOLUOL, AND XYLOL

Dr. Hamilton: A good deal of active work has been done on the subject of relative toxicity of benzol, toluol and xylol. Xylol is a little less toxic.

On tetraethylene, the only information we have comes from German. There they had to use it during the war as a solvent for fats in a large factory making shrapnel. They had four cases of poisoning develop with very marked symptoms of the same kind, that is, a man with a cut, who would get tetraethylene in his system and nine months later would still be suffering from a complete paralysis of the sensory part of the trigeminous nerve which hadn't yet passed, and carried with

the loss of the senses of smell and taste. Of course, that isn't as serious as benzol poisoning would be. I haven't seen anything else on tetrachlorethylene. All of those raw compounds of the fatty series have an effect like that of chloroform. If prolonged, you will get anaesthesia.

Mr. E. J. Riederer (Atlas Powder Co., Wilmington): I certainly hope the committee will be continued and give this matter more study in the future.

Chairman Kershaw: For those interested in gas masks, I would like to make this announcement. I received from the United States Bureau of Mines, paper No. 29 on the "Comparison of Gas Masks." It is one of the most interesting on that subject. It is right to the point and contains tabulations showing the relative advantages of the various types of masks. It can be secured from the Government Printing Office, or direct from the Bureau of Mines in Pittsburg.

Mr. Horan: If this committee is to be continued, the committee isn't going out to get the facts unless there is some place to get them. Our only hope of getting facts is to get them from persons like yourself or from the industries which you represent.

What the committee needs are blood counts and general physical condition of employees before they get benzol poisoning. The fact that a man has a white blood count of only 3900 on May 4th, when he was examined, doesn't mean a thing unless we know what his blood count was two days before he went into the benzol process and just how the changes took place. If there is any one constructive thing you can do in your industry—not only for your industry but for all industries—it is to follow these recommendations as closely as possible, with reference to new employees and old employees exposed to benzol. If some of you people will do that or get your doctors to do it, next year the committee will answer the questions you ask better than we have been able to at this time.

I ask on behalf of the committee that you give serious consideration to cooperating with us on the "Positive Recommendations."

SAFE HANDLING OF SOLVENTS

A. G. SMITH, CHEMIST IN CHARGE, TULSA FIRE INSURANCE COMPANY,
TULSA, OKLA.

The processes of rubber manufacturing are many and varied and there are great differences in the extent and manner of use of various solvents in the industry. It is, therefore, hardly possible to make general statements as to the hazards of solvents in the rubber industry but rather to indicate the dangers which do exist should certain solvents be adopted by the manufacturers for production of various types of rubber goods.

The problem of safe handling of solvents may be attacked from various angles. It appears that, of late, the general tendency in the industry is to create processes that overcome the necessity for using solvents in large quantities, or render those used less inflammable. Advance in precaution-

ary methods in handling solvents have been mainly in the establishment of improved storage facilities, ventilation, building isolation where the greatest quantities of solvents are used, solvent recovery systems and education of employees in the expediency of giving appropriate regard to the dangers of solvents.

STORAGE

The storage of solvents creates various hazards, the most prominent of which are due to the possibilities of fire and explosions. The character of installation, quantity of supply and protection against escape of liquids or vapors that may extend to surrounding property is governed to a certain extent by local ordinances and insurance underwriting regulations. The manufacturer realizes the expediency of these safety requirements that he may be required to work to and at the same time generally desires to be reasonably certain of protection against damage to his own property and lives of his employees. Experience with different kinds of installations allow the formation of an opinion relative to appropriate locations of tanks, distributing facilities and general practices in maintaining the solvents in a relatively safe manner.

The use of the underground storage tanks for solvents is preferable as they minimize exposure to ignition. The initial cost of installation for large quantity storage of solvents, however, is the deciding factor between underground and above ground systems for some manufacturers. The common practice is to keep large supplies in above ground tanks, located on ground sloping away from the plant and where there is a minimum opportunity for sparks from smokestacks, locomotives, smokers, etc. Above ground installations are commendable since leaks may be readily detected and installations easily inspected. Tanks may be painted and maintained in a good manner, thereby preventing depreciation which is more difficult to prevent for underground systems, and where also leaks may occur, unless a careful check is made of consumption, the leaks may not be discovered unless located by means of seepage which may promote a severe hazard. Above ground tanks should be provided with goose-neck shaped breather pipes fitted with a copper wire screen of not less than 40 mesh. Variations in climatic temperatures where solvents of relatively high volatility are concerned produce either a pressure or a slight vacuum within the tanks and this vent offers a relief. Installations consisting of a number of tanks located in a warm climate may have vents connected to a common main, terminating at a point where the solvents may be recovered, or disposed of in the atmosphere with the least amount of exposure to ignition. Tanks painted white, theoretically cause less evaporation of solvents than tanks painted black or other colors.

HOW LOSSES MAY BE OVERCOME

The loss of solvents to the atmosphere by means of evaporation and the hazard of inflammable vapors being prevalent in the atmosphere may be overcome to a certain extent by use of a newly developed compound

consisting of a mixture of, principally, calcium chloride, glucoses, glycerine, cornstarch and glue. These ingredients when thoroughly agitated and introduced into storage tanks are not soluble in gasoline and some of the other common rubber solvents. When applied about one inch thick the compound totally covers the surface of the liquid in the tank and excludes the air. Its weight when made into a sort of emulsion by agitation is about $4\frac{3}{4}$ pounds per gallon, being light enough to float on the surface of the solvent.

When more than one solvent is maintained in a battery of storage tanks, valves to distributing mains should be marked in some way to indicate when the valve is cracked open or closed. Pipe lines carrying different solvents should be painted distinguishing colors. This materially assists the attendant in charge in following the flow of solvents at all times from the storage system through pipe lines. For example, a red color may be used for indicating gasoline lines, yellow color for benzol, blue color for carbon bisulphide, etc. This color scheme could be appropriately followed out to the different departments of the plant where the solvents may be used.

It is a good practice to have pipe lines leading from storage tanks to pumps located within a plant or to auxiliary storage tanks, fitted with fine mesh screens to prevent any flames from extending back to storage tanks should a conflagration occur, even though these pipe lines are fitted with stop valves. Motor operated pumps, when located in the vicinity of tanks, should be housed in vapor proof compartments, and all fuses, starting boxes and rheostats should be enclosed.

The storing of benzol during winter months introduces the need of locating the storage tanks in heated fire-proof buildings. Benzol has the peculiarity of freezing and solidifying at 32 degrees Fahrenheit and does not regain a liquid state again until the temperature has reached approximately 37.5 degrees Fahrenheit. It is possible to store benzol above ground in outside tanks which are fitted with steam coils, because, in solidifying, benzol does not expand and rupture tanks the way water does. This storage practice has its faults, however, as the heating process is liable to produce vapors that are particularly susceptible to ignition. The most feasible means of storing it is in moderately heated fireproof buildings.

Owing to the unusually great volatility of carbon bisulphide as compared with other solvents used in the rubber industry this should be stored under water. Water dissolves carbon bisulphide to the extent of about 0.5 per cent but without imparting any dangerous properties to the water.

STATIC ELECTRICITY

Solvents or their vapors have been ignited by static electricity primarily because of the plant operator's disregard to the possibilities of static electricity accumulation and discharges, or because the plant operator does not suspect that certain conditions are likely to create static electricity. It is quite a well known fact that a cold dry winter's day

is most favorable for static electricity generation, but this is not the only climatic condition that may be favorable. Generally speaking any atmosphere containing a minimum amount of humidity may be just as favorable.

When certain machines, such as winding or spreading machines, are suspected of causing static electricity a simple test may be made by holding the back of the hand within two or three inches from the material going through the machine and if static is present an unmistakable tingling sensation will be noticeable. A neon gas detector as used for testing spark plugs on automobiles is also a sensitive testing device.

There are varying precautions that may be suggested to minimize the dangers of solvent vapor ignition. One of the fundamental reliefs from the hazard in rubber goods or rubber cement plants is to permanently ground each moving part of the spreading, slitting, winding or re-winding and agitating units to a common ground conduit that is positively grounded. Oil used in lubrication insulates one machine part from another. Soldering connections do not suffice in all instances as vibration is likely to sever the connection. Screw connections with lock washers and nuts are more dependable. Many thousand volts with relatively low amperage have been known to accumulate in a machine, on a belt, or in a solution, and unless this is thrown off by grounding or otherwise dissipated, a spark at a time when the explosive range of the solvent vapors in the air is correct is likely to produce disastrous results. Another mean of preventing static electricity accumulation, or its creation, is to render the atmosphere in a room humid by distributing steam from jets uniformly located about the room, or if a single machine is to be relieved of any static generation a perforated steam pipe near the source of generation will dissipate the static. Objections are raised by some manufacturers of rubber products to this practice as it is claimed that blisters in the rubber are caused by the presence of the moisture, especially when fabric is being impregnated or spread with a rubber solution.

For spreading, winding and cutting machines, metal idler rolls, horizontal bars having slight projections located close to the material passing through the machine, metal strips on metal pulley shafts connected to a ground, are commendable in drawing off the static. Replacement of belts for gear drives, and the providing of metal plates for operators to stand on when tending machines are also steps that help to eliminate static.

The sifting or screening of sulphur is a source of danger from static electricity and although screens are permanently grounded it is recommended that this operation be isolated from the main plant. This is advisable because the dust is so readily electrified when suspended in air that rapid changes in the static polarity take place, and these may be sufficient to cause a spark to jump to the screen or other objects and cause the substance to ignite. Sifting or screening machines may be so

arranged as to conduct these operations in the presence of an inert gas and thereby prevent the bad experience that some manufacturers are experiencing due to this one particular operation.

Metal top tables are preferable to all wood tables in cases where slightly plastic rubber sheets are cut to size, as the metal can be grounded to prevent static that is very likely to form when the sheet is stripped from the table. It would likewise be appropriate to remove any small containers of solvents that may be in close proximity to these tables.

CHARACTERISTICS OF SOLVENTS

When we speak of solvents having certain tendencies to produce an explosion, we refer to the likelihood of the vapors of these solvents being ignited in the atmosphere. The range of explosibility means the amounts of these vapors contained in an air mixture that is susceptible to explosion. These limits can be varied greatly by circumstances such as room dimensions, character of ignition, presence of moisture, temperature, etc. The wider the range of explosibility the more susceptible the vapors are to ignition.

Carbon bisulphide finds a moderate application in rubber plants for cement making and cold cure process. In commercial form it produces vapors that are heavier than air, therefore in instances where it is used in quantities it is particularly desirable to ventilate the department in which it may be used, by means of openings direct to the atmosphere near the floor level or by downdraft ventilating systems.

CARBON BISULPHIDE

Carbon bisulphide is an endothermic compound. By this it is meant that the elements forming it are in a state of chemical stress and capable of giving rise to a very considerable amount of heat by the mere action of their separation. In other words, an endothermic substance will give more heat when burned as a compound than can be obtained from burning its separate elements in the uncombined state. It has been determined that carbon bisulphide may ignite spontaneously at about 270-300 degrees Fahrenheit. This would make it possible to ignite it by its contact with steam pipes carrying a pressure of approximately sixty pounds. Particular notice should therefore be taken of storing containers of carbon bisulphide, handling it as a solvent or distributing it through pipe lines near power steam lines. As there appears to be considerable quantities of carbon bisulphide used as a solvent and in conjunction with sulphur monochloride in the "cold cure" process it would be particularly desirable for the manufacture to isolate the use of carbon bisulphide for these operations in order to obviate any bad experiences.

Carbon bisulphide is extremely sensitive to explosion by ignition when mixed three times its volume of oxygen or an amount of air containing that volume of oxygen. The combustion of the liquid or vapors by a

conflagration or explosion creates such irrespirable gases as sulphurous and carbonic acid gases, and therefore introduces a serious hazard in combatting a fire of this kind.

The handling of this solvent in the plant in dip tanks, in cement solutions, etc., should necessarily be in limited quantities, and the fumes should be exhausted or removed by ventilation because inhalation of them is extremely dangerous. They create headaches and digestive troubles, they affect the sense of vision and produce involuntary trembling of hands and legs. Continual breathing of vapors in small quantities may result in severe nervous ailments and insanity.

BENZOL

A solvent used to a considerable extent is benzol (oftentimes called benzene) which has a flash point in the vicinity of 25 degrees Fahrenheit and an explosive in air from 2.7 to 6.5 per cent by volume. Its vapors are readily diffusive in the air and susceptible to ignition, provided, of course, the amount of vapors is within the limits mentioned. Because of the agreeable odor of benzol fumes the average person does not consider them objectionable to inhale, consequently persons working in a room where the vapors are prevalent do not always realize when they are producing toxic effects. The vapors, however, are poisonous as well as explosive. Therefore, there is need of either preventing their creation by effective ventilation, or confining the solutions while they are being used, to prevent evaporations as much as possible. Benzol vapors when inhaled in moderate quantities produce sleepiness, faintness, headaches, nervousness, muscular prostration and irregularity in pulse. Severe accidents have been caused by persons being affected with small quantities of benzol to the extent that they will stagger and fall in moving machines or be otherwise injured by loss of control of their actions. Long exposure causes marked diminution of white corpuscles in the blood and degeneration of the liver, kidneys or other internal organs.

OTHER SOLVENTS

Toluol, xylol and solvent naphtha are occasionally used to produce rubber solutions. Their physiological effects on workmen do not vary considerably from those produced by benzol although they may, under average circumstances, be slightly less drastic due to these solvents being somewhat less volatile than benzol. The volatility and inflammability of each may be indicated by stating that commercial toluol ordinarily has a flash point in vicinity of 45 degrees Fahrenheit, xylol 80 degrees Fahrenheit, and solvent naphtha near 60 degrees Fahrenheit.

Gasoline is being used extensively in this country as a solvent not only because it is ordinarily less toxic in its effect upon workmen but because it is generally conceded to be more efficient as a solvent. It is employed as such in varying degrees of purity. A number of manufacturers obtain good results in the preparation of rubber plastic for use in impregnating fabric or for production of certain grades of cement by using a gasoline of a gravity near 70-75 degrees Be. This kind of

gasoline is volatile to the extent that it evaporates quite rapidly when exposed to the air, or when fabric containing the rubber solutions is passed over heated rolls.

In view of this, and on account of the fact that the vapors are heavier than air, suction ventilators are essential near the machines in order to eliminate the vapors from the atmosphere and to maintain safe working conditions in the plant.

It is judged that the range of explosibility of gasoline of this grade is from 1.5 to 6.4 per cent by volume in air. The hazards of explosion and toxic effects created by inhalation of the vapors are comparable to the effects that might be experienced with other light hydrocarbons. The vapors affect some workmen to the extent of producing headaches, stomach trouble, nervousness, vomiting and vertigo and temporary dullness of senses. These experiences by workmen may be prevented by appropriate ventilation and frequent change of occupation. Some manufacturers have replaced the use of benzol by the introduction of naphtha or gasoline mainly for the purpose of decreasing the poisoning hazard. It is claimed that wherever this practice has been introduced, satisfactory production results have been obtained, and there is less complaint of effect upon employees.

The solvent carbon tetrachloride has been used with a fair degree of success in producing rubber solutions and is relatively safe to store and use in a plant because it is not inflammable. Its market price, although fluctuating, is generally higher than other solvents that are adaptable to the rubber industry. Therefore, its use has been limited. To overcome this objection some manufacturers have used other solvents such as benzol, naphtha, gasoline and blended one of these particular solvents with carbon tetrachloride on a fifty-fifty basis, thereby reducing the inflammability of that solvent possibly one-half and good results have been obtained from a safety and quality-of-production standpoint. In this connection it might be said, for the sake of comparison, that these solvent solutions have about the same flash point as kerosene or in the neighborhood up to 100 degrees Fahrenheit.

At this point, Mr. Beck took the chair.

DISCUSSION

G. E. Minshull (E. I. duPont de Nemours & Co.): I would like to ask in regard to the propagation of flame, what size pipe do you start with to fill a tank?

Mr. Smith: I should say anything above an inch and a half. It depends upon the length of the pipe. If you put wire screening in, about thirty to forty mesh, it would not ordinarily collect sediment.

Chairman Beck: I was extremely interested in what you had to say about the painting of pipes. I think one of the code committees is working on a standard code for painting of pipes in industry. In our organization, we have a complete system.

Mr. Horan: I was wondering whether Mr. Smith could tell us any safe mixtures for cleaning machinery. We have serious accidents where

people use gasoline to clean rubber rolls on printing presses. I understand some people have done excellent work by doping gasoline with various mixtures to prevent fire.

Mr. Smith: Carbon tetrachloride is a good solvent of oils and greases for a safe standard, I should recommend it. You can also dope up a gasoline mixture containing about 65 per cent carbon tetrachloride, and have a slightly inflammable solution. I should say that the solution would be somewhat less inflammable than kerosene, probably having a flash point within a range of about 80 to 100 degrees.

Mr. Horan: Would 65 percent tetrachloride and 35 percent gasoline be ignited by a static spark?

Mr. Smith: It is rather doubtful.

Mr. H. Larkin (U. S. Rubber Co.): I remember some years ago a great many rubber concerns were using gasoline over spreading machines. I remember one case where there was quite an apparatus established but it was finally discontinued as being a failure. I would ask Mr. Smith if he has ever known gasoline being used over spreading machines, the object being two fold: (1) to recover the gasoline; (2) elimination of vapor from the room.

RECOVERY SYSTEM

Mr. Smith: The recovery system is very good for certain purposes, for instance, to eliminate the vapors by suction from the spreading machines or the operations from which you wish to draw off, but personally I don't know of any particular recovery system that has continued to operate. In other words, the cost of operation has been somewhat excessive. I should say that if any experiments are being made with the recovery system, they should be made in a building somewhat isolated from the main plant.

Mr. Ashe: Is there any particular difference in the use of benzol, whether you spray it on or paint it on with a brush?

Mr. R. Webb (Eastman Kodak Co.): I never had any experience with it, but I don't think there ought to be a great deal of difference. I know toluol is used as a solvent and as a matter of fact, has marked advantage because of its higher boiling point. I should think it could be applied with the brush just as well.

Mr. Ashe: In spraying it on, you might get more of the benzol.

Mr. Horan: The thought has come to me of one company that makes storage battery boxes. They had quite a little difficulty in painting storage battery compartments. Of course they are much smaller than transformer tanks. They tried dipping them, but they found it cost too much. In order to make a couple of hundred, they had to mix a hundred gallons of paint. Then they tried out a waterproof paint and filled the tank 95 percent full of water and put 5 percent of paint on top of the water. They would dip the boxes into the paint, down into the water, and back up through the paint again. They found it worked just as well as putting 100 percent paint into their tanks.

ELIMINATION OF OCCUPATIONAL DISEASES IN THE CHEMICAL AND RUBBER INDUSTRIES

JOHN ROACH, DEPUTY COMMISSIONER OF LABOR, STATE OF NEW JERSEY

The question of health conservation is one that not only affects, vitally, the welfare of our workers but also has an important bearing on the efficiency of trade production, for the productive capacity of our country can never assume high levels of importance while a steady and constant waste of the labor forces that make production possible continues undiminished.

During the past twelve years this vital and pressing problem has received the attention of trained specialists who have been employed by industries and governments to ascertain scientifically accurate methods for elimination or prevention of diseases of occupation that, at one time, were thought to be inherent in industry.

The rubber and the chemical industries have received attention of this kind and current industrial literature has received rich contributions from several investigations conducted therein. The cause, the cure and the prevention of industrial sickness have received attention of trained observers and investigators whose conclusions are widely read and whose recommendations are influencing trade processing in these important industries.

The whole problem of proper factory sanitation includes the control of dusts, poisonous and nonpoisonous, noxious fumes, excessive heat and extreme humidity, and undoubtedly it is the most serious problem that confronts any governmental regulatory organization having jurisdiction over it, for the fact is that the fight against industrial disease is practically new in America and employers as well as workers formerly seemed to accept the doctrine that certain trades were inherently dangerous and carried certain trade health handicaps that could not be eliminated.

THE PUBLIC IGNORES HEALTH DANGERS

Physical risks are obvious dangers easy to see, to feel and to understand, while the subtle dangers to health that spring from workroom air, polluted with dust and fumes, are not so well understood and these the general public calmly ignores. Yet, conditions of this kind have threatened many thousands of our workers, sapped their energy, reduced their working efficiency and set an economic brake on productive efficiency in the industry affected.

Fortunately, a decade ago, the working policy in modern industry began to substitute co-operation for command and to *influence* the worker, by persuasion, to make his greatest effort rather than to *demand* it through fear of the loss of employment.

Some of the larger and better managed industrial corporations, dissatisfied with working results achieved under the old system, after investigation of the probable cause of discontent and friction prevailing throughout their plants, arrived at the conclusion that the constant migration of labor (which severely handicaps the profitable operation of busi-

ness) was due in a large measure to improper working premises or methods affecting either the safety, health or comfort of their employes.

While it may be said that some of the investigations in connection with the rubber and chemical industries have lacked thoroughness, and the dramatic values have been over-emphasized when describing the risks and physical handicaps incidental to processing in these industries, still, in the main they have all been helpful and a pioneers' path has at least been blazed for investigators of the future.

MAIMED WORKER IS DISTINCT ECONOMIC LOSS

The physical care of the worker in the light of scientific research is no longer a matter for speculation or experiment. Indeed, it is now ranked as a matter of fundamental importance and is placed in the same business columns with the questions of wages, hours of labor and production. Furthermore, the index of experience has shown that even costly alterations to plant equipment and procedure tending to improve labor's condition and add to labor's safety are successful and satisfactory investments; because of the steadying effect upon the working force, increase in production and improvement in its excellence—factors which lead to eventual repayment.

In discussing this subject, while it is proper to present it from the viewpoint of conserving labor to make it more profitable and efficient, there is another factor of first magnitude in the matter, before which, in the final analysis, all other interests must yield. A maimed worker is not only a poor social asset but a distinct economic loss to the community. If his body has become weakened by exposure to trade poisons he can add nothing to our country's wealth, while his family may become a burden to society and even though compensation should be paid him (as in the case of accident), we must remember the burden of his support is not lifted from society but is merely shifted to the industry and finally borne by society as a whole.

Therefore, the community (which is conscious of its responsibility for the safety and well-being of its citizens), has given concrete expression of this interest either by the creation of labor laws or the establishment of industrial boards which are vested with sufficient authority to make safety rules that have the force and effect of law. But slight opposition has been made to the campaign for better safety rules for, when the essentials of proper working standards are based on reason and meet with the general approbation of the public, the advisability of conforming to such a practice has gone beyond the stage of discussion or argument.

The evil effects of dust, vapors or trade poisons on the human system are gradually becoming known to our workers and they accept with reluctance and only under the stress of necessity, employment where careless or indifferent shop management fails to provide adequate protection from health risks.

UNHEALTHY CONDITIONS BRED SULLENNESS AND RESENTMENT

The steady flow of immigrant labor that for decades has poured its generous flood into our industries, built our roads, tunnelled our rivers

and mountains, removed the coal and iron from the bowels of the earth and, in short, has performed the hard, coarse labor of society so necessary to industrial progress and development, has suddenly subsided, and almost overnight we are confronted with a labor situation that requires radical readjustments.

In the pioneer days of our industrial development but scant attention was paid by builders or architects to the question of providing proper sanitation, ventilation or heat in factory buildings and early attempts in this direction were not based on the products of technical reasoning.

The workers, on the other hand, accepted with apathy, primitive toilet equipment, lack of lavatory or bathing accommodations, dusty processes that filled the air, congested the lungs and undermined health and self-respect. They worked in barracks, bleak and cold in winter, charged with enervating heat or humidity in summer; and experienced all the hardships that naturally resulted from an industrial policy based on *laissez nous faire*.

Manifestly, the natural crop industry harvested from such unhealthful conditions included slop work, limitation of output, accompanied by shop disturbances and an entire absence of the spirit of co-operation which is so necessary to the complete success of any human enterprise.

In addition to putting a brake on production, the distrust thus aroused bred sullenness and resentment that often led to industrial crises of either local or state-wide magnitude and that impelled one portion of our citizens to regard with distrust and dislike another group who were equally important to the successful achievement of our national purpose.

The knowledge gained by the experience of the last ten years in the chemical and rubber industries is sufficient to warrant the assumption that with proper care and a wider recognition of the toxic qualities of many substances commonly used and handled in these industries, that occupational diseases can be prevented or at least kept within reasonable bounds so that they will not constitute an alarming departure from trade health conditions enjoyed by other industries.

The many poisonous trade substances that are to be met with in these industries are now well known or their character at least has been revealed by several important trade studies, including those carried on by Hamilton in the chemical and rubber industries, and Hayhurst in the rubber industry, and, later, an excellent report submitted to the rubber section of the National Safety Council by C. F. Horan, chairman of a committee appointed by the National Safety Council for the purpose of investigating "Dangerous Materials Common to the Rubber Industry."

In addition, Shepard and Krall contributed an excellent study on "Poisons in the Rubber Industry" that has had a wide circulation.

It would, therefore, seem that there is little need to amplify data already submitted. Industry has learned to its sorrow and regret the danger that results from permitting untrained men to handle poisonous trade substances or work in places where they suffer an exposure to poisonous dusts or vapors. If poisonous substances are used or handled,

their character should be explained to workmen who are exposed to their presence and, if dusts and vapors are generated, they should be collected and disposed of in such a manner as to preclude the possibility of their becoming a menace to health.

Expert medical attention and careful plant inspection should be provided and permitted to enlist all the aids that medicine, surgery and engineering science have created for the purpose of safeguarding the industrial worker from the evil effects of occupational processing.

INDUSTRIAL MEDICINE QUICKENS PRODUCTIVE ENERGY

Many employers of labor have recently subscribed to the twentieth century view, that things that retard and do not facilitate production should be tolerated by industry only so long as they are unavoidable. Accidental injury to industrial workers, that interrupts the flow of service society rightly claims and should receive from its working elements, is a handicap that should be prevented so far as possible.

Unskillful or improper medical treatment, or lack of medical treatment, should be frowned upon. Permanent loss of functioning power due to improper medical treatment, or lack of proper treatment, is a brake on industry, the force of which may be sensibly felt in the competitive markets of the world.

The basis of industrial prosperity is production, and things that interfere with production attack the very life of industry. A modern manufacturer readily scraps old machines that are less productive than the new, and he quickly avails himself of scientific trade data that may mean a complete rearrangement of his trade processing.

The employer should be willing to provide the best possible working conditions in order to safeguard the health of his employes and thereby add to their efficiency and regularity of employment. This can best be done by:

First: Providing pleasant, comfortable workrooms; notices warning workmen of the dangerous character of compounds handled or of gases or vapors that may be generated; physical examinations for workmen who are exposed to poisonous substances or gases or vapors.

Second: Providing appliances for the removal of physical hazards due to the presence of dusts, gases, heat and smoke and poisonous trade vapors if they are present in the breathing atmosphere.

Third: Providing appliances for lessening manual labor and reducing fatigue.

Fourth: Providing intelligent and sympathetic as well as efficient supervision over the workmen. It has been well recognized that the efficiency of an employe is greatly reduced by constant interference on the part of an autocratic overseer.

Fifth: Conducting an educational campaign for health and safety among employes in co-operation with health departments. This work, if tactfully carried on, can be extended throughout the plant and into the homes of the workers and in this way standards and modes of living can be greatly improved.

Sixth: Co-operating with the health departments in any work of investigative or research character which the local or state authorities may want to carry on in the plant.

Seventh: The establishment of an available hospital or first aid division within the plant or conveniently situated thereto.

Every manufacturing plant should have some form of medical relief available to employees. The form of relief required depends largely on the character of the work done in the factory and upon the number of employees. Every factory, no matter how small, should have at least a well-stocked first aid cabinet, administered by someone in the plant who has had a comprehensive course in first aid treatment.

A larger plant should install a dispensary in charge of a trained nurse. The character of the equipment would depend on the nature of the work carried on in the plant. This nurse could properly utilize a part of each day in home visitation work, in looking after absentees and sick and injured employees. Absenteeism has been greatly reduced where this work has been carried out in an intelligent manner.

MEDICAL SUPERVISION ESSENTIAL TO PLANT OPERATION

A large factory should have, in addition to the nurse and dispensary, a physician who should always be on call. It would be better yet if this physician were employed as a full-time man who could devote the time not needed in the dispensary to a study of plant conditions and processes, determining the hazards connected with each process as well as the type of employee best suited to the work to be done. Physical examinations of all applicants for employment in all plants should be conducted, and as rapidly as possible physical examination of old employees should be carried out with periodical re-examination of the entire plant personnel. In this way it would be possible to put the right man on the right job, and to a very large extent prevent a recurrence of the mistake of putting a workman at a task unsuited to his strength.

Where a number of small plants are located close together, it would be advisable for them to join in the establishment of a central dispensary in charge of a nurse and at least have a doctor on call who would care for the medical needs of employees. The cost of this dispensary could be met on a per capita basis, and I believe if this suggestion were intelligently carried out it would provide reasonable care for a large number of industrial workmen who now have no care of this kind.

Many of the larger concerns in the chemical and rubber industries are able to bear the expense of providing trained medical supervision for their employees, but a large number of smaller plants, many of which are handling substances that are dangerous to health and life, because of the limited amount of business, are unable to provide satisfactory medical supervision and if plants of this kind were to combine in groups it would be entirely feasible for them to surround their workmen with reasonable safeguards that are the result of competent medical supervision.

Many of the occupational disease reports that reach the office of the department of labor of the State of New Jersey refer to cases of poisoning in small plants where there is no medical supervision and where the supervising authority neglects to warn the workmen of the dangers obvious to trained eyes.

Furthermore, occurrence of occupational diseases in industry can only be prevented by sincere and earnest co-operation between plant managements, workmen employed and competent governmental regulatory agencies whose business it should be to provide industry with the very latest information on the subject.

The extension of workmen's compensation payments to victims of occupational poisoning should also prove a factor of very great importance in any preventative work that may be attempted, for experience has shown that since industrial accidents have become compensatable, extraordinary measures have been taken in industry to prevent the occurrence of accidents due to violence and which are covered by the Workmen's Compensation Laws.

NOTE: The literary contributions referred to in this paper were made by the following:

Alice Hamilton, A. M., M. D., Bureau of Industrial Hygiene, Harvard University.

Emery R. Hayhurst, A. M., Ph. D., M. D., Director, Division of Industrial Hygiene, Ohio State Board of Health.

C. F. Horan, Rubber Section, National Safety Council.

Norman A. Shepard and Stanley Krall, Research Laboratory, Firestone Rubber and Tire Company, Akron, Ohio.

ADJOURNMENT.

Chemical Section

October 3, 1923

S. R. KERSHAW, Chairman

Safety Engineering Division, Hercules Powder Company, Wilmington, Del.

E. J. RIEDERER, Vice-Chairman

Director, Inspection Division, Atlas Powder Company, Wilmington, Del.

G. E. MINSHULL, Secretary

E. I. du Pont de Nemours & Company, Wilmington, Del.

CHAIRMAN KERSHAW: Mr. Kepner, Chairman of our Membership Committee, reports:

"At the close of the last annual congress of the National Safety Council, the Chemical Section had 119 members. Since that time, we have had eight cancellations, and we have been able to obtain fifteen new members, so that at this time we have 126 members in good standing, and I trust that these 126 members will endeavor to get one new member each during the coming year."

I just want to remind you of the splendid bit of work done by the Industrial Poisons Committee, reported at the joint meeting yesterday, and I am sure we all appreciate the work that has been done by the committees during the year.

I appoint as Nominating Committee, Mr. Riederer, Mr. E. C. Rogers of the Grasselli Chemical Co., and Mr. H. F. Webb of the American Cyanamid Co.

THE SAFE TRANSPORTATION OF ACIDS IN CARBOYS AND DRUMS

MAURICE F. CRASS, GRASSELLI CHEMICAL COMPANY, CLEVELAND, OHIO

No safety engineer would attempt to limit his work to safety propaganda; work on the elimination of hazards, mechanical and otherwise, claims much of his attention. It may be considered axiomatic, therefore, in an industry commonly if not erroneously supposed to present unusual hazards, that the packaging and shipping of acids would, and of right should be considered a safety as well as a transportation problem.

The Bureau of Explosives, whose regulations are supported by the authority of the Interstate Commerce Commission, and thus given the effect of law, classify most acids as dangerous articles, which when

shipped, must bear the white acid label, which protects the package against undue rough handling and also serves as a warning to the handler.

Containers used for the transportation of acids must combine in themselves the necessary strength to endure reasonable transportation strains and ability to withstand the action of the product. Glass bottles come within the latter range and the jacketed carboy is used generally because it meets the two requirements mentioned.

The carboy cannot be considered a fragile container, but there are definite limits to its shock resisting strength, and a broken carboy en route means possible damage to merchandise as well as danger to workmen who may not be informed as to the proper method of dealing with such leakage.

The insistence, therefore, has been for a stronger, better-conditioned carboy and the adoption of regulations which would automatically eliminate the unfit. The Manufacturing Chemists' Association of the United States, upon invitation by the Bureau of Explosives, undertook a study of the problem.

Up to this time the bureau required semi-annual dropping and swinging strain tests, but these were shown to be ineffective because, with the old type of swing apparatus, the tests were susceptible of such manipulation as to make them unreliable. As a result, some carboys were in use which could not be considered other than sub-standard. The investigating committee devoted much time, pains and money in determining:

First: A machine that would give an approximately perfect swing strain test.

Second: Exhaustive experiments to determine a reasonable strain test requirement.

Third: Conditioning of carboys, perfecting of seals, etc.

DEVELOPMENT OF SWING TEST MACHINE

After exhaustive tests, a swing test machine was developed that is practically fool-proof in operation, giving an accurate gauge on the shock resisting strength of the package. This machine became officially operative on January 1 of this year.

With a standardized testing machine developed, it became necessary to determine the shock to which carboys should be subjected as a minimum requirement. This was a difficult matter, for it was necessary to consider:

First: The elimination of a large number of carboys in circulation, which were not equal in strength to other or better-conditioned types.

Second: The reasonable average strain to which these better-conditioned types should be subjected.

In approaching this problem, the committee synchronized (by means of service tests) reasonable shocks sustained by railroad cars with shocks sustained on the swing testing machine.

This information was obtained by loading a car of carboys (carboys filled with water) braced according to the best practice and bumping it at varying speeds against a substantial semi-rigid obstacle, consisting of a string of cars with brakes tightly set.

The test car was provided with a sensitive shock recording machine. The speed of the test car was accurately determined for each shock test, so that records were obtained at speeds ranging from 5 to nearly 10 miles per hour, at which latter speed the impact was so great that the truck king pin of the test car was sheared off.

The result of these tests, when applied to the carboy swing testing machine, was the determining of a swing test component of 55 inches—equivalent to a railroad speed or collision, shock of nearly eight miles per hour. I believe that with this brief description in mind we can state reasonably that the carboy can no longer be considered a fragile container.

It had been definitely determined through study of actual practice over an extended period, that much of the material damage, as well as burns sustained by workmen, were caused by defective or inadequate seals. The old method of placing a vitrified stopper on the lip of a carboy bottle, covering it over with a cast made of plastic clay or calcined plaster, then covering it over with burlap, secured with twine, no longer sufficed. This seal had the appearance of solidity, without the necessary strength; it was also convenient as a hand rest for moving the carboy, which added to its hazard.

After careful and exhaustive tests a new type of seal was developed, which has been made standard. This may briefly be described as follows:

First: A compressible gasket of acid resistant material.

Second: A porous earthenware stopper, which is acid leakage proof, but permits of no pressure being built up in the carboy.

Third: A metal mechanical seal, which effectively secures the stopper in place.

This gives a seal which is strong, safe and reasonably free from damage, at a nominal cost.

A further source of danger to both workmen and merchandise was in the use of carboys with chipped lips; such a carboy could not be sealed with entire safety. A machine was developed which will surface away the depression in the lip, thus leaving a perfect surface on which to seat the stopper and gasket. The time is very close at hand when damaged lip carboys will be barred for transportation service.

Conformity to I. C. C. regulations governing the conditioning and sealing of carboys is now assured by the revised regulations, which became operative the first of this year, which provides that one of the semi-annual service tests required shall be made in the presence of a Bureau of Explosives inspector.

These tests are mandatory at all Plants or Stations where carboys are repaired and filled.

DRUMS FOR ACID SHIPMENT

It might be commonly supposed that a steel container would embody, in itself, the maximum of strength and efficiency in the course of transportation. There are many variables, however, which must be taken into consideration.

First: The drum must be made of metal of sufficient gauge to withstand severe strains and the deterioration incident to its service.

Second: It must be free from carbonized or oxidized spots in the welded seams.

Third: The inspection and testing service before filling should be efficient and carefully supervised.

Occurrences are exceptional where a drum sheet or head gives way in the metal. The 12 gauge requirement for 110 gallon and 14 gauge for 55 gallon 5-A drums is deemed ample protection. Careful operators, however, provide for natural wear and tear by placing a minimum weight at which drums are automatically retired from acid service. This should be common practice.

It has been found through recent tests that drums constructed of dissimilar metals, are subject to electrolytic (galvanic) action, which greatly accelerates deterioration of the metal. It is, therefore, important that the drum sheet, welding metal, collars and plugs be of similar metal. Regulations governing construction of 5-A drums will probably provide for this.

A smooth inside surface of drums, free from corrugations for rolling hoops, is desirable as these depressions tend to hold drippage from emptied drums and thus localize deterioration.

Coarse threads should be cut for plugs and drum collars as a better resistant against acid action and providing a stronger seal. Gaskets made of acid resistant material, such as asbestos, should invariably be used under the plugs.

All users of acid in drums should scrupulously observe the rule of storing filled drums in a cool place and never expose to the direct rays of the sun. Acid is volatile; liquids of any sort expand under increase of temperature and danger of explosion will be avoided with the exercise of this ordinary precaution. Full drums when stored for any length of time should be stored with plugs up and plugs loosened frequently to release any pressure which may have accumulated. Many explosions have resulted through neglect of these simple rules.

DISCUSSION.

Mr. M. C. Goodspeed (General Electric Co., Erie, Pa.): I would like to ask whether dangers incident to storing of drums in the sun applies equally to carboys, or does the special sealing that you just described relieve the pressure so that the sun doesn't have the same effect on the carboys?

Mr. Crass: The comparison is not similar, for the reason that the use of this porous earthenware stopper would prevent volatilization of the

acid due to the application of heat from the rays of the sun. All careful fillers of carboys will not fill a carboy fuller than the level of the top of the carboy box, and that allows enough air space to take care of any ordinary pressure that is built up. But with the use of the porous stopper, there is no pressure generated at all; it is relieved automatically as fast as it generates. I would be glad to give information to any who are interested as to where these stoppers can be procured. They can be purchased just as cheaply as the old vitrified stopper. They are patented, but given to the public at no charge.

There is a misconception in regard to the handling of drums. A good many concerns, in times of depression when they store the drums, wash them out and put them away. You couldn't do a worse thing than store a drum with the drum-plug out. The drum-plug should be put into the drum immediately after washing or be kept in the drum before washing, and if I were to store drums, I wouldn't wash them out. Sulphuric acid pickles the drum and reduces the corrosion or destruction of the metal. If you wash them out, you form a distillate, and that will destroy the drum much more quickly than if you had stored it with a little sulphuric acid in it.

Mr. Ira V. Kepner (Pennsylvania Salt Mfg. Co., Philadelphia): We had a number of acid drums during the war which were shipped to various small powder industries. They were brought back to our plant and taken out of service, washed out with water, and stored away.

During this year, we had occasion to ship some caustic soda liquor from one of our plants to another. We loaded this caustic liquor into these drums. When it left the process, it was probably about seventy degrees Fahrenheit, and it slowly passed along into a trough and dropped into this drum. We loaded about fifteen or eighteen of those drums, putting an ordinary wood bung in them, because it crystallizes. We just tapped it in lightly with another bung. These drums had been loaded into cars and had been shipped from our Pittsburgh plant to our Philadelphia plant. We had probably shipped forty or fifty prior to this. The men who handled them were ordinary gang laborers. In this particular shipment, we had loaded seventeen drums. The eighteenth drum had been loaded probably ten or fifteen minutes, and a couple of workmen threw the drum over on the side and started to roll it. They had rolled it fifteen or twenty feet when it exploded.

I have written to all my friends in the chemical industry to have them explain to me the cause of that accident. It puzzles me. I would like to know if there is anyone here who can give me an idea as to what the trouble was. I thought possibly they might have used that drum in some small plant to store some other product in for the time, probably nitroglycerin. But the drum had not been used for three or four years; the drum was rusty. We just shook it around and knocked the rust out.

SUB-STANDARD DRUMS

Mr. Crass: I think you will find, if you investigate those packages, that they were sub-standard. We had an occasion somewhat similar to that, drums that had been stored, an accumulation from the time of the

war. They were only used once. We attempted to use them again about six months ago, and we found practically the entire lot to be unfit.

An ordinary twelve-gauge drum will weigh about 215 pounds. When that drum deteriorates to around 190, it is time to look out for it. I think if you weigh those drums, you will find they are pretty close to 190 or 180 pounds. Secondly, after a drum is repaired, we always subject it to a hydrostatic pressure of 15 pounds. If it will stand that, it will take care of any ordinary expansion of acid due to change in temperature, and that is an important thing to do when drums are repaired in any case.

I want to give you a word of warning regarding the repairing of acid drums. You know the effect of sulphuric acid on hydrogen gas, which is very explosive. We ourselves had a number of explosions before we came to the point where we put down definite rules guiding the repaired drums. Where a drum is repaired, we forbid the use of an open flame, whether oxy-acetylene torch or electric torch or any kind of an open flame. We do not allow an open flame to be near the drum, even a lantern, and we repair the leaks by means of a soldering iron. If you can't repair them by means of a soldering iron, you had better throw them into a scrap heap, because hydrogen gas will shatter a drum in pieces. If an open flame in the hands of a plumber or a lead burner happens to get near an open seam, or possibly the drum plug is out, you are taking a long chance on an explosion.

Chairman Kershaw: Supplementing what Mr. Crass has just said, I would suggest that all of you gentlemen who have drums in your plants that are apt to be picked up by the repairmen for use as water tanks and things of that kind, be very careful about the practice of steaming and washing out the drums before a man ever uses a cutting torch on them. We have had one or two explosions such as Mr. Crass speaks of in our plants. I can recall one in which a man was cutting a drum outside of a repair shop building, and the thing let go and threw part of the drum into the repair shop through a window. Fortunately, in that case, as I recall it, the man was not injured, but he had a very narrow escape.

Mr. Kepner: I would like to know what I can do with something like eight hundred drums. I have still got those seven or eight hundred drums. Would you junk them? Would you steam them out, clean them out, put them under pressure? What can we do with them?

Mr. Crass: I would subject them to hydrostatic pressure to determine their fitness. Also neutralize what acid remains with a soda-ash solution, so as to leave no taint of acid base in the drum for possible combination with any product you put in.

DANGER IN SCRAPPING

Mr. E. J. Riederer (Director, Inspection Division, Atlas Powder Co., Wilmington, Del.): The point was brought up by Mr. Kepner that if the drums were not good enough to use for the soda solution or caustic, possibly they ought to be sold for scrap. If there was anything in the drums which might cause trouble to the party intending to sell the

drums, and they sell them for scrap and ultimately some trouble arises in the hands of the scrap dealer or some other concern having bought them from the scrap dealer, the responsibility will come back to the party who sold them to the scrap dealer. A concern I know of had a case of that kind. They sold some material, and it went through three hands and then caused trouble, and the responsibility came back to the party who originally sold it. It cost them between thirty and forty thousand dollars.

I would recommend, in this particular case, not knowing what the drums might have been used for, to wash them thoroughly with soda solution, then fill them up with water to clean them out, and then steam them.

Dr. F. A. Hodge (National Aniline Chemical and Dye Co., Buffalo): I just want to call attention to one thing more that might be in the drums. If the drums were used during the war, they may have been used for the transportation of spent acid which had been used in the nitration of gun cotton, and some of that cotton might be sticking around inside of the drum. I am not prepared to say offhand just what the action of caustic liquor would be on the gun cotton. I think it would be sufficient, however.

Mr. C. E. Stevens (Merrimac Chemical Company): Right at present, we are having considerable experience with the handling of old drums. We are disposing of quite a few that we have in our yard, and had a junk dealer come down there to look at them. They are perfectly willing to take them without our cleaning them or washing them. This junk dealer wanted to know what the idea of our washing them was before we gave them to him. In opening those drums even now, there is an enormous pressure in some of them. The men have to be extremely careful in taking a bung out. They stand it up on the end and have a long wrench and get out of range of the bung when they open it. Some of those bungs will be blown for a distance of 15 or 20 feet. We then wash the drums out, take a pick and break in numerous holes in the ends of the drum, so that they are thoroughly washed, and there will be no chance for any gas to generate in there before we let the junk dealer take them from the yard. I am pretty sure that that method of handling them is giving them to the junk dealer in a good, safe condition.

**A SAFETY CODE FOR CHEMICAL LABORATORIES WITH
SPECIAL REFERENCE TO EXPLOSIVES LABORATORIES**
HENRY N. MARSH, TECHNICAL DEPARTMENT, HERCULES POWDER COMPANY,
WILMINGTON, DEL.

The invitation to present this paper on a Safety Code for Chemical Laboratories arrived while we were busy preparing such a code for use in our own plant laboratories. It seems that safety receives all the attention possible in the plant while the laboratory, with its many very real risks, has been somewhat overlooked.

It has been the practice with our company to send out bulletins, from time to time, covering unusual conditions that come to our attention in-

volving risks to the chemist; and the manuals of Analytical Methods call the chemist's attention to conditions that must be observed in certain operations to avoid accident but we thought it would be well to bring together these precautions into a code that would be of particular value in instructing the new chemist; for the first thing we must teach the new chemist in an explosive laboratory is safety

Our safety engineer, Mr. Kershaw, submitted to us a rough draft of his ideas on the subject and, from this as a starting point, we have, with the assistance of other members of the Technical department and our experimental station, drawn up the code which we are submitting to your attention. This code applies particularly to our own conditions but we hope to develop, from discussion, other points we may have overlooked and hope that others may obtain some suggestions and ideas for their own use.

In this presentation we have rearranged the subject matter to place those items of more general interest first and to outline more briefly those rules peculiar to our own risks, later.

1—BUILDING

In laboratory buildings having more than one room, care should be taken to see that the rooms in which there are flash, fire and explosion possibilities, are not located where the effect of an accident would cut off escape from the other rooms. In such rooms the apparatus most likely to cause such accidents should if practicable, be placed as far as possible away from the room exit.

Unobstructed egress facilities should be provided on at least two opposite sides of each floor of each building.

Sufficient natural or artificial ventilation should be provided to keep the laboratory free from harmful fumes. Hoods should be used for acid digestions and all other operations liable to produce harmful fumes.

Adequate illumination, both natural and artificial, should be provided for all rooms. Drain pipes should be of acid proof, high silicon iron or of lead.

2—HOUSEKEEPING

It is essential, from a safety and efficiency standpoint, that the laboratory be kept in neat and orderly condition. Floors, shelves and tables should be kept free from dirt and all unnecessary apparatus.

Apparatus which is infrequently used, should be kept in the stock-room and that which is of necessity kept in the room where the work is being performed should be arranged as neatly as possible.

Apparatus should be set up well back from the edge of the bench. It leaves more room for work and there is less possibility of upsetting.

3—STORAGE OF CHEMICALS AND APPARATUS

Heavy articles should be stored as near to the floor as possible. Glass apparatus should be stored so that the ends do not project beyond the shelves. Glass tubing should be stored horizontally and should be kept off the floor.

Shelves should be provided with copings to prevent chemicals and apparatus sliding or rolling off.

Laboratories in which explosives are handled should have magazine facilities properly located as to distance and barricades and all explosives should be removed to the magazine at the end of the day's work. At least once a week, the chief chemist should inspect the magazine and remove all samples, the analysis of which is complete. Not more than 100 pounds of explosives may be in the magazine at one time. Especial care must be taken to keep this magazine scrupulously clean.

Bottles of volatile inflammable liquids should not be placed in direct sunlight or near artificial heat.

4—FIRE FIGHTING EQUIPMENT

Adequate chemical fire extinguishers should be provided and placed, preferably, in the hallways. If placed in a room they should be near the door and away from the principal fire hazard. Extinguishers, made by breaking the tip of large burned out electric light bulbs while immersed in a container of carbon tetra-chloride, permitting them to fill, then closed with sealing wax; if placed around a laboratory at frequent intervals provide a cheap and effective means of extinguishing small blazes before they become dangerous. Such extinguishers should not be placed in rooms devoted to dynamite and nitroglycerin analysis.

Always ventilate a room promptly after using carbon tetra-chloride extinguishers as poisonous gas forms under certain conditions.

Carbon tetra-chloride extinguishers should be tested at least once a month to see that they are full and in good operating condition.

Soda-acid type extinguishers should be emptied and recharged at least once a year. A tag showing date of last charge should be attached.

Wool blankets should be provided for use in clothing fires, especially in laboratories handling highly inflammable liquids.

5—GAS SYSTEM

Where gas systems are used to supply bunsen burners, etc., frequent inspections should be made to detect leaks and all laboratory employees should report immediately the odor of escaping gas. On account of the wide range of explosive mixtures of acetylene and air, this is of especial importance with such outfits.

In the case of gasoline gas machines, be sure to close the valves in the main gas line and the air supply line and then vent the tank before attempting to re-charge.

Drums of gasoline should be stored in isolated buildings protected from the heat of the sun and artificial heat. Drums should not be opened until ready to charge and care should be taken to see that the vapors from the operation are not exposed to flames and sparks or other hot objects. If possible, the machine should be charged early in the morning and, even then, beware of pressure when opening.

Be sure all gas-burners are turned off at night. It is good practice to turn off main gas supply line outside the building at night.

6—COMPRESSED GAS CYLINDER

Cylinders of compressed gases, such as oxygen, carbon dioxide, etc., should be stored away from artificial heat.

When opening such cylinders always stand away from the face of the reducing valve.

Avoid even traces of oil on reducing valves on oxygen tanks.

7—LABELING OF BOTTLES

All bottles containing chemicals should be plainly labeled. (Material found in unlabeled bottles should be thrown out unless it can be identified positively.)

All violent poisons such as cyanides should be kept in bottles distinctively labeled with the usual skull and cross bones and the word *POISON* in red capital letters at least $\frac{1}{8}$ in. high.

All bottles containing explosive material, except hard rubber nitroglycerine bottles, should have affixed thereon a white label bearing the word *EXPLOSIVE* in red capital letters. Bottles containing explosive materials should be kept separate from non-explosives. Cleaning solution should be kept in stoppered bottles so labeled.

8—GLASS TUBING CONNECTIONS

The ends of all glass tubing should be fire-polished. Before inserting tubing into stoppers or rubber tubing, be sure that the hole is large enough to accommodate the glass. Moisten the tube and stopper thoroughly except when necessary to avoid moisture as in nitrometer set-up. Hold the stopper between thumb and fore-finger; not in the palm of the hand. Grasp the glass tube close to the end that is to fit in the stopper and push the tube with an even pressure.

9—DRINKING FACILITIES

One or more drinking fountains should be installed. The practice of drinking from beakers is dangerous and has caused death.

10—DESSICATORS

The well of desiccators containing sulphuric acid as a drying agent should be encased in a metal guard lined with asbestos cushions.

Vacuum desiccators, before use, should be tested under a higher vacuum than is normally used, if possible. Vacuum desiccators in which sulphuric acid is used should be placed in a four mesh galvanized screen basket or wooden box before evacuating. (See Fig. 1.)

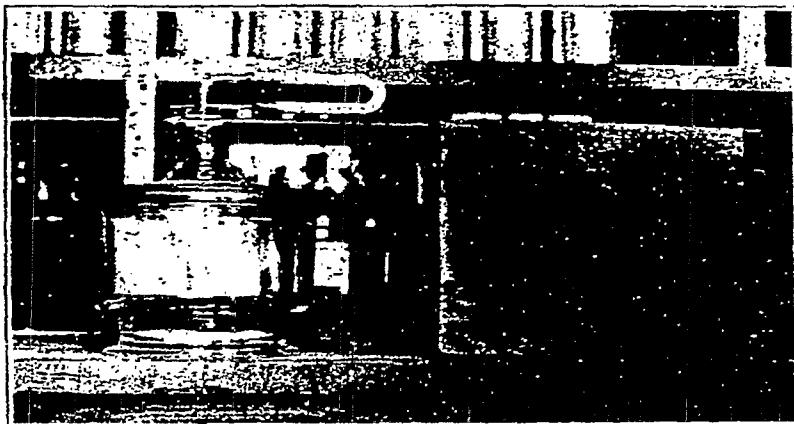


Fig. 1. Guard for a vacuum desiccator. The desiccator should be placed in the box before evacuating. A galvanized screen basket might also be used for this purpose.

11—FILLING PIPETTES AND STARTING SIPHONS

Pipettes should be filled by the use of a suction bottle containing bicarbonate solution or by bulb, never by sucking with the pipette in the mouth. The same equipment should be used when necessary to start a siphon by suction. (See Fig. 2.)



Fig. 2. Always use a suction bottle to fill a pipette or to start a siphon. This will prevent serious burns and poisoning.

12—ACID ANALYSIS

Sample bottles should at all times be carried to and from the laboratory and from place to place on the plant in standard wooden box type sample bottle carriers with stout handles. (See Fig. 3.)

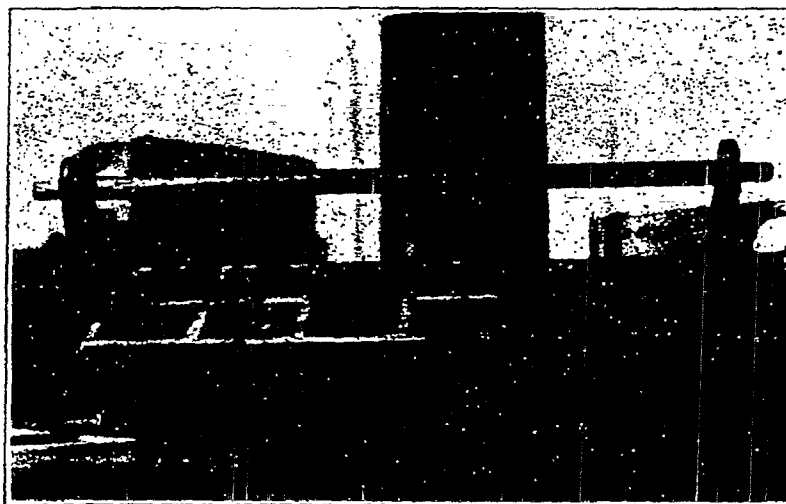


Fig. 3. Standard wooden box type sample carrier for acid samples.

Rubber gloves should be used when mixing and blending samples.

Tables for acid blending and storage of samples in the laboratory before analysis should have lead tops with upturned edges to keep spilled acid away from the clothes of the chemist and to prevent sample bottles from rolling off.

The laboratory should be equipped with a safety shower for use in case of acid burns. In lieu of this, one water spigot should be fitted with a large rubber tube, so that a heavy stream of water can be directed on the body in case of burns. The severity of strong acid burns can be reduced by prompt application of copious amounts of cold water.

It is advisable to keep several bottles of sodium bicarbonate solution available in case of acid burns and two per cent acetic acid solution for caustic burns. These should be kept in distinctively colored bottles conveniently placed about the room. Never apply the bicarbonate solution to a strong acid burn until the acid has been washed off with water. (It is not safe to use acetic acid solution stronger than three per cent in the eye.)

Where standard solution bottles are placed on overhead shelves, the bottles should be surrounded with a strong rail or otherwise secured from falling due to ordinary vibration or explosion on the plant or in the laboratory.

Carboys which contain strong acid should be set in a good carboy inclinator. Where carboys are carried, a safety carboy carrier or truck should be used.

13—NITROMETER

A comfortable and effective face mask should be worn by operators using the nitrometer. It is desirable to wear a rubber apron while conducting this operation.

Under no circumstances should the lower stop cock of the decomposition bulb be closed after a charge is introduced until no further evolution of gas is evident.

If nitrometer acid is kept in a bottle fitted with a siphon or spigot, the bottle should be set in a strongly secured box not more than four feet above the floor.

14—DRYING SAMPLES

Ovens used to dry samples of explosives or highly inflammable materials should have the latches removed from the doors. This eliminates danger of wrecking the oven in case of explosion. Materials containing volatile inflammable liquids should be dried in steam ovens only.

Ovens used to dry samples of explosives should be enclosed in substantial screen cages designed to retain missiles in the event of an explosion. (See Fig. 4.)



Fig. 4. Left—A substantial screen cage placed around a constant temperature electric oven which is used to dry samples of explosives. In event of an explosion in the oven, missiles and flying piece of glass are retained. Right—The same cage open, giving ready access to the oven. Note in this picture the 60 mesh brass wire screen placed on top of heating element to prevent particles of inflammable or explosive materials falling onto the hot wires of the element.

It is advisable to install a 60 mesh brass wire screen over the heating element of electric ovens used to dry explosives and highly inflammable materials. These screens should fit snugly to the walls of the oven.

Stand to one side when opening the door of an oven containing explosives or highly inflammable materials.

15—VOLATILE INFLAMMABLE LIQUIDS

Distillation flasks, where feasible, should be heated over a sand or water bath in preference to an open flame. An open flame should not be permitted in a room in which either, acetone or alcohol is being distilled.

Distillation flasks should be surrounded by a metal or transite board enclosure with wire glass windows.

16—NITROGLYCERIN SAMPLES

Standard hard rubber sample bottles with soft rubber stoppers should be used for all nitroglycerin samples. They should always be carried in the standard nitroglycerin sample bottle carrier with the locking cover. (See Fig. 5.)

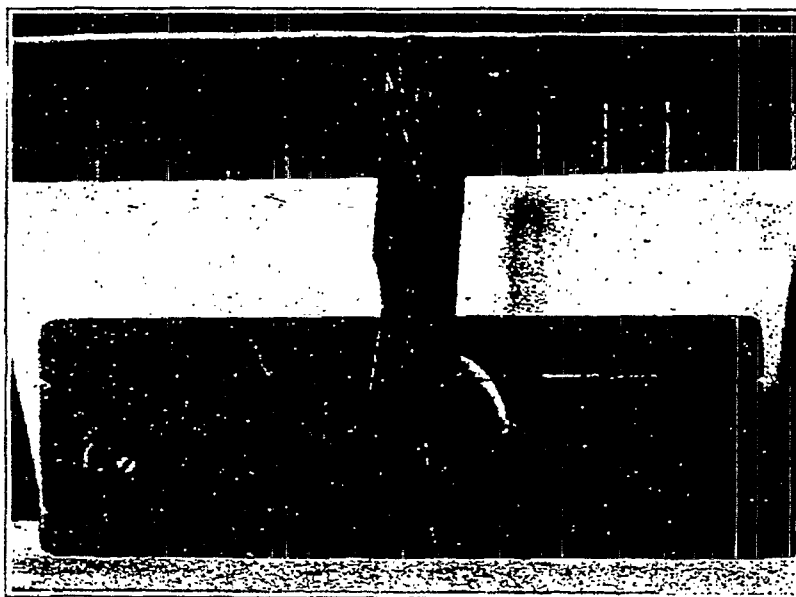


Fig. 5. Nitroglycerine sample bottle carrier. Note that raising the handle to carry, locks the cover in place. All nails and screws used in the construction of this carrier are of brass and a wooden peg sliding in a wooden groove locks the cover.

Nitroglycerin should never be placed in glass containers with glass stoppers. Nitroglycerin in glass beakers should be stirred with hard rubber rods only. In other words, contact of glass to glass in the presence of nitroglycerin is to be avoided.

17—DYNAMITE SAMPLES

No open flames are permitted in dynamite laboratories. As far as possible, iron apparatus and instruments should not be permitted in dynamite laboratories. Clamp stands are especially objectionable.

Dynamite samples should be collected and carried in special wooden box typecarriers in the construction of which no iron is used. A carrier divided into compartments serially numbered is desirable to collect mixed samples.

If wash bottles containing acetone or any solutions other than water are used, they should be so labeled and plainly marked to prevent confusion with water bottles.

Windows should be fitted with actinic glass or should be shaded.

18—DISPOSAL OF REFUSE

A fibre bucket without metal bail should be used for waste explosives. It should be distinctively marked with the words *Waste Powder Only* in large capital letters and should be used for no other purpose. Sufficient sawdust should be kept in the bottom of it to absorb any liquid explosive that might be present.

Solvents used in the analysis of explosives should be mixed with enough sawdust to absorb them and sent to burning ground. Under no circumstances should they be flushed down the drains.

Acids and strong alkalies should be thrown into the sinks and flushed down with water. Such materials should not be put in refuse jars.

Refuse should be collected at the close of every day and not be allowed to accumulate. Liquids should be drained from the refuse, except in the waste powder buckets, before hauling to the burning ground or dump. Waste explosives must be taken to the burning ground and disposed of in a safe manner as is outlined for that operation in plant rules.

19—DYNAMITE TESTING GROUND

The shooting ground should be fenced off with, preferably, a wire fence to prevent anyone venturing too near at a time when tests are about to be made. All paths leading toward the shooting ground should have warning signs posted at least 100 yards from the enclosure.

Substantial shelter or barricade must be provided from which to fire shots.

The sand or cinders used on the shooting ground should be carefully screened to remove stones and large pieces, to prevent missiles flying and to provide proper bed on which to shoot the tests.

All tests should be fired with electric blasting caps. No safety fuse should be used. The firing line should be equipped with two plug switches and a spring switch. The plugs are to be removed by the operator and carried in his pocket and he must be sure that he has both of them with him before connecting the detonator to the line.

A blasting machine should be used in preference to dry cells but the use of such a machine does not obviate the necessity of equipping the firing line with plug switches which must be used as described above.

Before a shot is fired every precaution must be taken to see that no one is close enough to be in danger from flying missiles. The use of a large gong rung for at least ten seconds before firing is a desirable precaution.

acid sample. We had the wooden box with the compartments in it, and, being rather clumsy, very often the men did not like to use it, so we went from that to an aluminum container which seemed to be quite a considerable improvement. It stands up very well against any slopped acid and it is very much lighter, and, being soft enough metal, doesn't have any tendency to wreck the bottles of acid.

In connection with the oven for drying nitrated cotton, instead of having the front door of the oven arranged without a latch which, in the event of a sample of cotton going, would blow the door outward into the room and perhaps burn an operator who might be loading another oven nearby, we have arranged to have collapsible backs. The front door is very thoroughly latched, and the collapsible back is simply held in place with a very loose catch, simply balanced in place. In the event of any cotton going, it exhausts into a chamber which is connected with the outdoors with adequate vent. Of course, that dead air space is kept locked, so that no one can get into it.

Mr. John H. Vogt (New York State Department of Labor): As one who has been connected with the Department of Labor for the past fifteen years, there is no one who realizes more keenly than I the danger which is prevalent in the chemical laboratory. I myself have seen many injuries occurring in plant chemical laboratories and I would like to ask the gentleman who so ably got up this paper if he has any information in relation to the number of accidents and character of accidents. I have seen some serious accidents in relation particularly to the position and placing of different chemicals where they have been knocked off the shelves and explosions have occurred. I believe the gentleman did not touch on that particular point.

Mr. Marsh: I don't have any statistics. We haven't had, so far as I know, in the five or six years that I have been connected with this work, any large number of serious accidents. There have never been any fatal accidents in any of our laboratories. There was a case where a man lost the tips of two of his fingers in the explosion of material that he was grinding. Probably the most serious cause of trouble has been the breaking of bottles in the laboratory, where the man breaking the bottle spills strong sulphuric acid on himself or something of the sort. I would be glad to tabulate such information as we have on that and send it to you if it will be of any help to you.

PROHIBITION OF MATCHES IN LABORATORIES

There is one thing there that is not mentioned in the code which applies to all explosive plants, and that is that there are no matches permitted anywhere on the plant, and there are no matches permitted in the laboratory except where Bunson burners are used, and we are working toward the elimination even of the use of matches in that place. That was so obvious to me that I completely forgot to mention it in the code. It should be there.

Mr. Riederer: The use of water bottles in direct sunlight very often produces the same effect as a lens, and several fires have occurred from the lens formation of the liquid contained within a bottle. Our company has made it a practice, and followed it very closely, to have all windows in the laboratory which are struck by the direct sun rays either painted or protected in such a way that the sunlight can not pass through the windows. Even the window itself may produce a lens formation, and in that case, an explosive being in the focus will cause a fire.

Mr. H. F. Webb (American Cyanamid Co., Niagara Falls, Ontario): Assuming, Mr. Chairman and Mr. Marsh, that this code is prepared for the new man in the chemical laboratory, and seeing that you have dealt more in explosives than anything else, I am wondering whether or not it wouldn't be a good plan to say something of the safe clothing that the chemist should wear. For instance, we all know that the chemist who works in an explosives plant should not have any nails in his shoes, and it is a good plan not to wear cuffs in his trousers.

Then again, in speaking of the building, there is the matter of the floor. That has considerable bearing in an explosives laboratory. Of course, if there is a wooden floor in there, these steel nails shouldn't be used or they should be countersunk and done away with. Also the wood floor will absorb nitroglycerin if there is a spill there, or will gradually absorb some of the powder, or whatever it may be, and that will render it very dangerous to the employees.

Another point that might be mentioned is drinking facilities. It is a mighty good plan to have drinking fountains of the bubble type. That has not only the advantage of being extremely good as far as sanitation goes, but it is especially valuable to a man that gets an acid splash in the eye. If he should get a splash of acid in the eye and run over to the drinking fountain and hold his eye over the bubbler, he will get a whole lot better service than if he has to do what I had to do one day, and that is dive head first in a barrel of water. Regarding the placing of shading over the windows, we have conducted some experiments recently with a new type of plate glass which has been put on the market known as Actinic Glass. Those experiments have not gone quite far enough for us to say positively that it is an absolute protection, but we have found that it is impossible, even with a carefully prepared lens, to bring the rays of the sunlight behind a sheet of this glass to a sufficiently sharp focus to ignite nitro-cotton. We believe that that type of glass is going to be a particularly desirable thing to place in the laboratories and in buildings on high explosive plants.

AMBER GLASS

Chairman Kershaw: This glass that Mr. Marsh speaks of was invented during the war. It is an amber-tinted glass which can be purchased in large sheets of all kinds, even corrugated wire glass, I understand, and its effects are very interesting.

Mr. J. H. Barnholt (E. I. du Pont de Nemours Co., Wilmington, Del.): I think this, Mr. Chairman, is sufficiently important to start a Safe Practice Pamphlet of the National Council. Is it possible to start that here through Mr. Marsh's paper in some way?

Chairman Kershaw: It seems to me that it would be quite in order to make a motion to the effect that we ask the Headquarters Staff to consider a pamphlet to contain such points as are of general interest to laboratories in chemical industries.

The motion was carried unanimously.

Mr. A. B. Clark (National Aniline Chemical Co., Buffalo): Our accidents have almost exclusively resulted from utter carelessness on the part of the laboratory operators, such as, for example, caustic spills or splashes and that sort of thing. We do have a very embarrassing situation to meet in the disposal of comparatively large quantities of highly inflammable solvents—benzol, toluol and all of the nitro products and aniline. If anyone in the room has had any experience with disposing of large quantities of these materials, I would appreciate suggestions. I was in the Bureau of Chemistry when we blew out all of the plumbing by throwing ether down the sinks.

Mr. H. F. Webb: We have one method of taking care of solvents. Of course, it may not be applicable to other plants that are not as advantageously located as we are, because we have our own distilling department. All waste solvents are kept in proper containers. Any waste benzol, for instance, is kept in a friction top can, that is, a can that is practically hermetically sealed. It is taken out periodically and delivered to the distilling department where whatever recoverable values there are, are recovered. So we have, insofar as the laboratory is concerned, no trouble from that standpoint.

Chairman Kershaw: We have another very interesting subject on the program, and that is "Chemical Burns," which is right in line with this question of laboratory hazards. I am going to ask Mr. Watson, who is chairman of our industrial poisons committee, and who has a big burn problem in his plant, to act as chairman of the meeting while this discussion is in progress.

CHEMICAL BURNS

Mr. A. L. Watson (Hooker Electrochemical Co., Niagara Falls, N. Y.): Let's have a real round table discussion on chemical burns. In order to start the thing off, I notice in Mr. Marsh's safety code for chemical laboratories, that he suggests the maintenance in laboratories of acetic acid in bottles for neutralizing caustic burns. Can I hear some discussion on the relative value of acetic acid as against zinc sulphate, for instance, in neutralizing caustic burns?

Mr. Clark: We use large quantities of water and immediately apply it and let it go at that. It is very rare that a man gets a serious enough splash in our laboratory to warrant more than washing. If it is more serious than that, it is a hospital case.

Mr. J. J. O'Leary (Atmospheric Nitrogen Corp., Syracuse, N. Y.): We have been very successful in using the acetic acid immediately and very freely. We haven't had a hospital case yet, and that has been our only treatment.

Mr. Richardson: When I worked with the caustic, we always had a pail of diluted acetic acid in water, and men repeatedly, particularly in working about the caustic furnaces, would go and wash their hands and even their faces to remove the sting, the bites, as it were. Our pipe fitters used the protection of rubber gloves. Invariably they had well examined rubber gloves to use in handling their tools and in placing fittings in pipe lines. Those two things were really effective. We very seldom had caustic burns of any serious nature whatever.

Mr. Watson: The reason I brought up the question is that in the concern with which I am connected we have used for a great many years a zinc sulphate solution for neutralizing caustic on the skin or in the eyes in preference to the other material. Perhaps there is no choice between them, but I thought possibly someone here might have some data on the relative merits of those two chemicals.

Mr. R. E. Vanatta (Pittsburgh Plate Glass Co.): We have a lot of caustic burns and use the acetic acid; also a weak solution of sulphuric, I think, and we use the solution that you have just mentioned; also a lot of water. I think the chief advantage in the use of any treatment in the caustic burn is the idea of getting at it quick and using it often. I know when we first sent most of our caustic burns to the doctor, and they were treated, say once or twice a day, they extended over a very long time, but since our nurse has learned that frequent treatment is really the thing, and they treat them six and seven times a day, two or three times in the forenoon, keeping the scab off a caustic burn, they seem to heal up much more quickly. For any kind of an acid burn in the eye she uses a little oil of some kind, keeping that from drying up, and it makes the burn heal a lot quicker. We handle practically all of our eye cases right in our first aid hospital, and we have better success than in sending them out in nine cases out of ten.

Mr. Watson: If there is no further discussion on that particular point, can we hear something in reply to Mr. Richardson's question?

CHROME SORES

Mr. Richardson: As all chemists know, chrome doesn't really burn, but when it gets into an injury it prevents healing, and the serious character of the sore which results from that prevention is a cause of great concern to factories which have the handling of processes involving chromium in some of the products.

Those things become very serious at times. For instance, a mere cut on the hand will produce a permanently disabled member if it isn't taken in time and if it doesn't get the proper treatment even though taken in time. Perhaps some members may have an effective method of handling those situations. It is a doctor's job really.

Mr. Crass: I think that matter is best treated in a pamphlet which I obtained from the English government through their printing department, and I submitted the treatise which they forwarded to me to Mr. Kershaw, I believe, this past year. I haven't the data here, but if anybody is interested in this information pertaining to any of the chrome compounds, they would find that pamphlet very interesting and very instructive.

In connection with the production of bichromate and other chromium compounds, we have found that cleanliness is the best preventive. We absolutely insist upon the men changing their street clothing before they go to work. We insist upon their washing, and then before they eat their meals, we keep their dinner pails and insist upon their passing through a washroom so they wash their hands and faces prior to going to the diningroom or to their pails. If they go to any other point outside of their work, we insist upon their washing their hands, so that they won't contaminate any portion of their body because of any chrome compound on their hands. Then we also insist upon a thorough shower bath with soap. We furnish the soap and furnish the towels. That bath is compulsory prior to the men leaving the plants. Then they change the clothes that they use during the course of their employment and change to their street clothes which are in a separate locker by themselves prior to going home.

We were very seriously troubled with chrome sores and itch prior to taking these precautions, and since insisting upon this enforced cleanliness process, we have practically dismissed that as one of our troubles.

Mr. Watson: Will Dr. Slater tell us a little bit about the Kodak's practice in mixed acid burns, both body and eye burns? I think that will be quite interesting to everyone.

Dr. W. A. Sawyer (Eastman Kodak Co., Rochester, N. Y.): Our practice is to have the drinking fountain type of irrigation with reducing valves, so that a man who turns on the water won't strike the eyes with too great force. At another place, there is a large tank for the men who are burned with the acids to jump into.

My conception of an acid burn or a caustic burn, either one, is that they essentially have the same action on the tissue. My conception of the proper treatment is, as this gentleman over here pointed out, promptness. The amount of tissue destruction is directly dependent upon the time that the agent is burning, the amount of the agent, and my feeling is that if you can get copious amounts of water very promptly, that is the very best thing that you can do.

With the drinking fountain type of water, you are getting clean water. It is better than throwing water out of a pail which has been standing around the department and which may have a lot of dust and dirt and things of that sort. For the acid burns, we use a solution of sodium bicarbonate, and I have found that there is a great tendency not to use enough of the solution.

We see a fellow come into the dispensary with a little reddening of the skin and a little elevation, and we feel that the burn really doesn't amount to anything, and I have found that the next day that acid burn may extend very deeply into the skin, and instead of having what we call a first degree burn or a second degree burn where just the skin is destroyed, that, after all, the acid has burned down and gotten into the deeper tissues underlying the skin, and you have something which is important. We keep them soaked in bicarbonate solution, and actually by putting sodium bicarbonate on; the nurse for a half hour to an hour does nothing else but that.

As to the treatment of the burns, I am sorry to say, after they are firmly established, there aren't any specifics. I believe that you may use an oil if you know that the oil is sterile. I don't believe in using carron oil; there are some people who do. I don't believe in it because I have found that it is not sterile, and, after all, a burn is a wound in exactly the same way that any other agent may injure the tissue, and the thing that the surgeon has got to look out for is cleanliness.

Mr. Watson: What oil do you use?

Dr. Sawyer: I use a borated vaseline, which has the antiseptic action of the boracic acid together with the whole thing being sterilized. I am using that not as a specific against the burn at all, because I don't think it is a specific, but I use it simply that when you change the dressing the man won't complain of the pain because of the adherence of the dressings to the skin.

Recently in the Rochester General Hospital we had a very unfortunate experience where a man was burned on practically two-thirds of his body. He was one of the fellows who lit a match when he was getting some gasoline. I have never seen anything so horrible in my life. He had just one-third of his skin left. We had a great opportunity to study the various agencies in burns, that is, the paraffin wax and the vaselines and the unguentine and all of that. The general impression is this—use as few dressings as possible and keep the dressings changed often enough to keep the wound sterile.

BURNS ARE HEALED ONLY BY NATURE

There isn't anything in the world that is going to heal burns. A burn is healed by nature itself just exactly as any other wound is healed by nature itself. When an appendix is taken out, there isn't anything rubbed on to heal the skin, to heal the wound. The appendix is taken out, the man is sewed up and the wound goes ahead and heals. There are no salves, no ointments, no grease, nothing at all except sterile dressings over the wound. Ninety-nine out of a hundred of our uncomplicated appendix cases, that is, where there is no pus, heal perfectly without the assistance of any oil or grease or anything of that type. If I use a borated vaseline, it is not with the idea at all that I am healing anything. I am using it simply so that when the dressing is removed, the man won't suffer from the pain.

I think it is a great advantage, as has been pointed out, to change the dressings frequently, so that the secretions which form from the burn may be promptly removed and not reinfected. I would urge all of you to insist that the acid burns be neutralized for a long period of time. If you don't, you will find that a seemingly trivial burn the next day has become a serious burn. After all, our experience is not large because we don't have many serious burns. We have had a few fellows that have spilled acid on their feet. The very peculiar thing about the caustic burn is that it just simply bores a hole down wherever it touches, and it will scoop a hole out of the top of a man's foot just the size of a quarter and go right on down through until you get it neutralized.

Mr. Riederer: Might I ask Dr. Sawyer if he has had any particular experience with nitric acid? We use a great deal of very strong nitric acid, up to ninety-eight and a hundred per cent. We have found—I tried it on myself several times—that after it is neutralized with bicarbonate of soda for a considerable length of time, the hard scab forms which one of the gentlemen here referred to, and the wound from nitric acid requires from three to six weeks to heal. If you remove that hard scab on the second or third day, it is painful, but just tear it off and let it bleed and the wound is liable to heal in less than a week's time.

I had my entire face burned with a mixed acid six years ago and the wounds were all covered with scab. After a week's time, it began to itch so that I shaved, contrary to the doctor's instruction. I did that on Saturday, and on Tuesday, my face was healed. Have you had experience similar to that?

Dr. Sawyer: I have noticed the exact thing that you speak of, that there is a slough of charred tissue that gathers on the wound, and as you look really down into it, you will find that slough there, and I have always considered that it ought to be removed. You can put a little novocain around the wound and pull it off without a great deal of pain to the man.

As a matter of fact, I don't feel that a deep burn will heal in a week. I don't think it will heal in much less than three or four weeks, and some of them will take possibly six weeks, because there is so much tissue there that has to be reconstructed. But I do think it is a good plan to remove all slough.

PROPER USE OF WATER

Mr. Crass: May I have one more word? Whenever I hear of anyone speaking of the use of water in connection with acid burns, I want to emphasize it. I have known of acid burns where a man has gotten his leg or arm into it or gotten a splash over a large area of his body and they have used water but they haven't used enough, and the result of that has been a chemical reaction of the water upon the acid and a sort of cooking effect. The burn resulting from it has been worse than the acid burn. The word "copious" should be emphasized if possible. If it is on the trousers or coat or shirt, don't wait to unbutton, but pull them off and immerse the man in water.

Mr. C. C. Rutledge (General Chemical Co.): In handling strong sulphuric acid, we have had experience where we couldn't get enough water on it to prevent the burning from the heat generated by the water, and we find it is safer to wipe off the acid with a dry cloth first and then apply water. I think that is an important thing, especially when acid is as strong as 100 per cent.

Chairman Kershaw: I am going to ask Mr. Kepner, of the Pennsylvania Salt Co., to take the chair.

Mr. Kepner: Gentlemen, for the last four or five years, the various concerns that manufacture and sell safety devices have come to the various congresses of the National Safety Council for the purpose of interesting the chemical engineer and the engineers of all other sections in what they have to sell.

While the National Safety Council is not boosting any particular firm, these various individuals that have come here year after year to exhibit their products always have something of value to the safety man in the industry. For instance, we have just had a discussion on burns, what a person would do in case of a burn, whether to jump into a tank of water or under a bubbling fountain. We have Mr. Chester who has an eye applicator for burns or anything in the eye, and I would just like to have him demonstrate for a moment what he has.

Mr. Chester: You gentlemen who are coming in contact with acid burns of the eyes may possibly be interested in learning of this instrument. We have here an attachment for the ordinary faucet in which we furnished different shaped rubber inserts for an attachment. We have here an automatic over-flow, so that you do not get the entire pressure as you turn it on, but just sufficient for the work that the instrument is devised for. At the same time, in here, if it is thought necessary at any time, medicated tablets, such as your plant eye specialist or physician may prescribe, may be placed; or where you are using in our first aid hospital an irrigation stand, we have a separate attachment for that purpose which naturally hasn't any overflow feature, and in that irrigator you would then place your medication. For the purpose of burns, where you want to use pure water, that medicant would be unnecessary, but the feature is there if you want to use it. The result is the water passes up into the body of this instrument, and from a number of little, tiny needle-point holes around the eyes on both sides, it throws a fine needle spray all around the eyes, giving them a thorough flushing or irrigation, which this tubing in turn carries away and back down the basin, so that if you wished, you could put anywhere from a few pints, quarts or even gallons of that water or liquid around the eye to ameliorate the suffering from those burns. On the other hand, if there be any small particle of dust, grit, dirt which has got in there and yet which is loose and difficult to find, this instrument will flush it out.

Mr. Watson: I have one criticism to make of that apparatus—at least I consider it a criticism. You use an inverted open vessel to contain the liquid that is to be washed through this instrument into the

eyes, and it occurs to me that with that open vessel standing in a room for an indefinite period, it would be very unsanitary. I think it would be much better if that open vessel was replaced by an inverted bottle or something of that sort that would be closed and keep out dirt and other things.

Mr. Chester: This can be attached to any wall pocket or vessel of any kind that you may wish to use. Of course, in using an irrigator stand even, a nurse in charge of the hospital will naturally fill up her tank fresh when she is up against an eye case.

ADHESIVE TAPE

Mr. Kepner: Are there any other questions you would like to ask?

We next have here an adhesive tape. There are a whole lot of different ways of giving first aid in the plants, especially we will say a cut on the nose. This adhesive tape is sold by a large number of concerns that sell safety equipment, and they merely cut off this small piece of adhesive tape, take it back, pull it out, and put it on the nose or finger, and it takes care of those small cuts until you can get to a doctor. If a man were to tie a rag around it, it would be in his way.

Next we have goggles. In the chemical plants they use different kinds. There are probably fifty different concerns represented here and almost every concern uses a particular type, and they standardize on a particular type that they like themselves. But we are always alert to getting these boys that have something new in the goggle line to bring it up and show it to us. At this time, I would be glad to hear from Mr. Larsen who has a special goggle to demonstrate.

Mr. H. J. Larsen (Willson Goggles, Inc.): It is needless to say that there has never been a satisfactory device for protection to be worn over spectacles. We have worked for a number of years on such an article, and we believe we have at last something very satisfactory. I have my own correction made up in a frame that is necessary for this device, a forty millimeter rod frame, and it can be had in metal or with a shell rim. It is fitted with springs on the inside. You will note that I now have protection to my eyes and also protection to an expansive pair of lenses, which means quite a bit in most operations. My spectacles are not distorted in any way; the vision is absolutely normal. In removing them, all I have to do is take them off and go home. Every part in it is replacable and is made to withstand heavy treatment. I am going to leave it on the table in case any one wishes to look at it.

Mr. Kepner: We would like to hear from Mr. Nutt. I believe he may have something to say.

Mr. B. W. Nutt (Safety Equipment Service Co., Cleveland): I just have one or two things I want to show you. We have been giving considerable attention in our company in the last year to providing some sort of protective clothing which might be useful in the chemical industry. It is a rather difficult problem because there are so many different operations and also so many different chemicals and acids and

one thing and another to contend with, and, as we have found true in goggles, you can't find one kind of clothing which will take care of all different needs.

The thing I want to show you now is a helmet which we have developed and which has been proving fairly successful to prevent splashes on the head, neck, face and shoulders. This is made of a rubberized cloth which is more or less acid-proof. I got over saying it is absolutely acid-proof because as soon as I say that, somebody comes along with something I never heard of, and there are a great many of those things. I will admit. But this has been found to be very useful in a great many cases.

This helmet is constructed over a frame which is adjustable so that it will fit any head and fit it comfortably. The construction is of light metal frame in which is fitted a head-band. This head-band may be adjusted so it will fit the head of any ordinary man. This gives the helmet form and allows the covering to rest over the head easily and not bind and also allows a free circulation of air, as much at least as is possible on a helmet which is not intended primarily to be supplied with fresh air. We might say, however, that this helmet can be supplied with fresh air by putting a fresh air line to the top of this thing and in that way allowing a free circulation of air underneath it.

In order to keep the band from slipping down too far on the head, we put a strap inside which takes up the weight. This particular one is fitted with a piece of mica in front, but it can also be fitted with glass if required and can be made renewable by taking this piece out. The attachment for air can be made through the top, and this has given very good satisfaction.

PROTECTIVE SUITS

We are also producing complete suits of this material either a one-piece or a two-piece suit. It has a draw string around the arm and around the leg, so that a man may wear boots or gloves in connection with it. We are also producing sleevelets, which come from the arm up to the shoulder and which may be used over the ordinary type of acid glove such as this.

Another thing we have found useful is a legging which may be produced of the same material. This is the type of legging we use; it is our foundry legging but it has been adapted to this same purpose by covering it with the acid-proof cloth. This has two fiber boards inside which give form to the legging and enable it to be put on the leg and keep a perfectly smooth surface. This is fastened around the leg in this fashion and is held in position by a spring which comes on the outside of the legging. That, in this particular instance, is covered with this material. If you want to get this legging off in a hurry, simply pull the spring and it drops off. We are adapting this to other classes of work by lengthening it up to the hip.

Mr. Kepner: Next we would like to hear from Mr. Seagraves. He has just a few things he would like to demonstrate to you. One of the first things is a gas mask which we all use in the chemical industry, or the majority of us do.

Mr. H. J. Segraves (Mine Safety Appliance Co., Pittsburgh): Those who were at the meeting last year where we discussed respirators remember Mr. Watson's paper, and I have been in touch with him a few times about his home-made respirator. One of the plants that I furnished with a model which Mr. Watson loaned me wouldn't make up the home-made respirator, and they had us make up some. I wanted you to know that in case you wanted some of those.

I mentioned at that last discussion a dust mask. In the chemical warfare service, the flat filter was found to be the best medium of removing dust from air. This is the dust mask. It has a large filter. The dust-laden air passes through and spreads itself over the entire surface, and there is a corrugated screen inside which allows the free circulation of air underneath this covering. We take our air supply then from between two of these filters right up into a large, free, breathing outfit with a regular exhalation valve.

In connection with this outfit, or in connection with the gas mask with which you gentlemen are very familiar probably, I want to show a dust hood or a chemical hood. This can be made up of light rubberized fabric or heavy rubberized fabric, in order to cover a man's neck or ears. That has been one of the troubles with gas masks in such a case as strong ammonia fumes.

Mr. Kepner: It looks funny, boys, but for anybody that has any work to do in handling bleach, it is fine. We use them, and they are splendid.

Mr. Segrave: The jumper is put on the outside. We have rubber goggles in which we have a smaller orifice and a shaped cup, and we put water inside here. In case the goggles fog up, just a shake of the head deflects that water against the lens and keeps it free from the collected moisture.

FOGGING OF GOGGLES

Mr. Kepner: That is something new that is just out. There has been a great deal of trouble in the mines because of goggles fogging up; also going through your bleach chambers where the heat hits your goggles and fogs them up on you.

Mr. Segrave: This is the dust-proof respirator in which we use a filter of felt inside of the pressed cotton filter or the sponge. This was tested out in the Bureau of Mines unofficially and found to be at least as good as any other filtering medium they have on an ordinary respirator. We use it in connection with an aluminum respirator with a pneumatic cushion. The felt disc is held between two copper screen discs of 150 mesh with a little larger than the space in which it fits, so that there is a slight bulge, and we get a bearing all around the outside, and all the dust-laden atmosphere will go through the felt. There is a small rubber relief valve.

These are all replaceable by means of snap fasteners which makes it mighty convenient.

This is the combination mask in which we may use a cannister of our all-service gas mask type or size, connected directly to two lengths of hose. The cannister is on the back in this case. We can substitute for the cannister a length of hose which runs to outside air, for cleaning tank cars, etc. At the same time, the harness consists of a safety belt which has tested hardware and a ring tested to fifteen hundred pounds tensile strength. This belt when worn will permit a man to be raised in an upright position. There is a picture that shows how a man is held in this harness.

In case you have to drag a man out of a trench or a man-hole, very often with an ordinary life belt or rope, the rope either cuts the man or he is mutilated in getting through the opening. This holds him upright and lets him get through any space that his shoulders will go through.

Mr. A. U. Barnes (Standard Safety Equipment Co.): About our only item of interest would be the wide vision goggle which has been generally adopted by the chemical industry, I believe, and which gives a 490 degree range of vision. I believe some of the largest chemical companies in the land have tried that out and made a test of throwing a bucket of water against the goggle with the idea of seeing if the water would filter through, the idea being that if it was acid it would burn the eye, with the result that no water trickled through, and enough of the larger companies have adopted it so that it has proven itself practicable. The ventilation at the top and bottom tends to prevent condensation, which is a draw-back in some of the older attempts at goggles. I will leave a sample here on the desk if anybody wants to see it.

Mr. Edward Terry (Safety First Supply Co., Pittsburgh): Although we have just this one thing with us, we handle everything that you might think of in the safety and first aid line. This is just a small board showing how we put up stock, and it measures twenty-five by twenty-seven in the door here, that is, the glass opening; and the stock board is thirty-two by forty. We make two other designs, too, in stock boards, but we are willing and ready at all times to make any special board that you might need. The lettering in the glass is sand-blasted. It is cut right in that glass and filled in with paint. The board itself is made of twenty-six gauge galvanized iron and painted with a coat of enamel iron paint.

Mr. Kepner: I want to thank all these different exhibitors for coming up here and waiting so long, and I thank you gentlemen for your indulgence in staying until it was over.

REPORT OF NOMINATING COMMITTEE

Chairman Kershaw: Gentlemen, I will detain you only a minute, to hear the report of the Nominating Committee.

Mr. Riederer: The Nominating Committee begs to report as follows:

Chairman: { A. L. Watson,
Hooker Electrochemical Co.,
Niagara Falls, N. Y.

Vice-
Chairman: { M. F. Crass,
Grasselli Chemical Co.,
Cleveland, Ohio.

Secretary: { Mr. McNaui
Fibre Silk Co.,
Buffalo, N. Y.

Upon motion duly made and seconded, it was voted that the report of the Nominating Committee be accepted, and that the Secretary be authorized to cast the unanimous vote of the Section for the gentlemen named.

Mr. Watson: I am deeply appreciative of the honor, and I hope that, with the assistance of the past officers of the Section and the new officers and the new committees, we will be able to do as good work as the Section has done in the past.

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ADJOURNMENT.

Cement Section

October 3 and 4, 1923

HENRY A. RENINGER, Chairman

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

H. G. JACOBSEN, Secretary

Manager, Bureau of Accident Prevention and Insurance, Portland Cement Association, Chicago, Ill.

WEDNESDAY MORNING SESSION

CHAIRMAN RENINGER: We have been trying to carry on the work with member plants of the Portland Cement Association through the committee on accident prevention and insurance, of which Mr. Tagge is chairman, and through the Bureau of Accident Prevention and Insurance of the same association, of which bureau our secretary of the Cement Section, Mr. Jacobsen, is the manager. We have been doing safe, sane safety work in the cement industry and from all that I can gather I feel that the cement industry as a whole has done more in safety work, and has got better results than any other industry. The statistics we compiled in Chicago are being used now by insurance companies to get their experience on accidents in the cement industry. There is no question but that we have aroused a great deal of enthusiasm throughout the industry since the Portland Cement Association has appropriated \$1,500 for a trophy to the mill making the best record with the lowest accident figures on the basis of man-hours worked during the year 1923. At this morning's session Mr. A. C. Tagge, vice president of the Canada Cement Company and the chairman of the committee on accident prevention and insurance, of the Portland Cement Association, will preside.

(Mr. Tagge assumes the Chair.)

Chairman Tagge: It is very pleasing to those who are interested in safety work in the cement mills to get as good a gathering as this of men whose daily work it is to look after safety of the men at our plants.

As members of the nominating committee I appoint Mr. Frame, from the Alpha Cement Company, Mr. Huth, of the Universal Company, and Mr. Purkhiser, of the Lehigh Company.

Major Reninger (Lehigh): Gentlemen, we have with us Sir Thomas Oliver, of England. Sir Thomas has been kind enough to come in here and give us a short talk.

SIR THOMAS OLIVER SPEAKS

Sir Thomas Oliver: I thank you, gentlemen, for the very kind reception you have extended to me. Really I have only a few words to say, because I have never seen in the cement works any serious illness traceable to the occupation. Cement making is a dusty occupation, but somehow or other the dust that is inhaled does no harm to the individual.

You can easily understand that there are various kinds of dust. There are certain dusts which are soluble. There are certain dusts which are soft and there are others in which the particles are extremely hard and angular.

The soluble dusts, unless you are dealing with what you would call poisonous substances, really do very little harm. The soft particles undergo some change in the secretions in the respiratory passages. The hard angular particles inflict injury upon the lung.

Although cement-making is a dusty occupation, the workers are remarkably free from any lung trouble, and that obtains not only in this country in the cement factories that I have visited, but also in Europe, in those which I have seen in my own country. One can only believe, that the cement dust undergoes some change so that it is not harmful.

The only criticism which I think cement-makers might suffer is in the exposure of great heat of some of the men in the burning department and I understand that the men sometimes suffer from what you call heat prostration, but that is not confined to cement-making alone, because it also occurs to men who are out in the open air and exposed to the direct rays of the sun. We can therefore not regard that as a hazard peculiar to cement-making. The only thing to do in cases of heat prostration as many of you know, is to have the patient taken at once to a hospital and treated, because one of the effects of prostration is to cause the temperature to rise very rapidly. The normal temperature of the body, as you know, is 98.5, but under heat prostration it will run up to 105 and 110, and the only thing to do is to put the patient into a cold bath, and keep him there until his temperature comes down to 103, or something like that.

Now, as I said before, this hazard is not confined to your trade at all, because it occurs particularly, too, in stokers of large ships. I don't see that there is anything special in cement-making that brings it under the category of what you would call dangerous trades, nor do I find that in cement-making, there is anything like what can be called an occupational disease. I think, on the whole the longevity of the cement-maker is quite equal to that of the average of other people, and therefore, I don't regard cement manufacturing as a dangerous occupation.

Major Reninger (Lehigh): I move that we give Sir Thomas a rising vote of thanks.

(All arise.)

Chairman Tagge: We will now proceed with the regular program.

SAFETY FROM THE EXECUTIVES' STANDPOINT

COL. E. M. YOUNG, VICE PRESIDENT, LEHIGH PORTLAND CEMENT COMPANY,
ALLENTOWN, PA.

We are living in a wonderful country. Sometimes we forget to fully appreciate the advantages we enjoy. Our nation is all the more remarkable because of its rapid growth and development. The population of the U. S. in 1850 was less than 25 millions, in 1880 it had only increased to 50 millions and today the total reaches 110 millions. It is only 90 years ago that Chicago was incorporated as a town and four years later as a city. The estimated worth of this country in 1912 was 188 billions, and 1923, 300 billions.

In the same manner the cement industry has had a remarkable and rapid growth. Only 33 years ago, which is well within my recollection, the production of Portland Cement in the United States was less than half a million barrels. In 1900 it had risen to 8,482,000 barrels. During the next ten years there were many plants built and by 1910 production had risen to 76,549,000 barrels. Last year, 1922, showed the largest quantity produced, namely 114,789,984 barrels, and 1923 promises to exceed 1922 by at least 18 million barrels, bringing the total for the year to probably 132 million barrels. Is there anywhere so remarkable a record of growth in the industry within so short a time?

Cement companies in the earlier days conducted their business and operated their mills in a very simple manner. Few understood costs and none realized the tremendous wear and tear of heavy machinery. The words, depreciation, obsolescence and depletion made only a hazy impression on the minds of those in charge. The result was many failures.

Companies which survived, slowly and gradually began to realize the necessity for better methods in all directions.

The placing of a federal tax on incomes of corporations had much to do with proper accounting, with consideration for depreciation and other items of loss. Competition brought about greater mill efficiency.

Workmen's compensation laws adopted by almost all states brought the attention of manufacturers to the serious dangers to which employees were exposed in cement mills. The slogan of "Safety First" began to be heard. Devices to minimize accidents were placed at all points of danger, with the result that today all properly equipped plants have safeguards wherever necessary.

HUMANITARIAN ASPECT OF SAFETY WORK

Compare this with conditions 10 to 20 years ago and the contrast is most striking. Many executives and managers for years failed to take the subject of "Safety" seriously considering it more or less a silly fad, but gradually the importance of this wonderful movement has impressed itself on the minds of all competent and progressive manufacturers.

Safety work is above all humanitarian. What a harrowing sight it is to have a husband, father or son brought home on a stretcher maimed, dying or dead. Anything to lessen distress should appeal to the hearts of all men. Safety work pays financially.

If a company carries its own insurance, then naturally the lower the number of accidents the lower the cost. For the same reason a company which covers with insurance receives a low or high rate according to its record.

Safety work improves efficiency. Nothing has ever been introduced into cement plants which has touched the hearts and spirits of employes as has the interest of the management in their physical welfare. The work of the safety committee, the prizes for good records, the rivalry between plants for the least number of lost days bring about an esprit de corps which could not otherwise be developed.

The Lehigh Portland Cement Company was among the first to recognize the importance of this great movement. All its plants have long since been organized along safety lines; committees are regularly selected and a reasonable sum is turned over yearly by the company to each committee. This money is used in many ways—a portion perhaps for a dinner to those who have been active in safety work. A careful record is kept of all lost days and the rivalry between plants is simply remarkable.

Because of the constant effort of the safety committees to prevent accidents, it has become a sort of monitor which not only wields an influence over the men but does not hesitate to call to account a careless foreman or indifferent superintendent. The safety committee interests itself in keeping the mill clean and sees to it that all unnecessary obstacles are removed.

The Lehigh Company three years ago decided to carry its own compensation insurance in all states other than Pennsylvania. Each year there is credited to a reserve account an amount equal to the premiums which would have been paid to insurance companies.

By reason of the splendid work of the safety committee and the enthusiasm of the men, this reserve has grown to a very tidy sum and in the course of a few years, with the same experience, the amount credited each year can be materially reduced.

SAFETY RECORD OF LEHIGH COMPANY

The Lehigh Company is very proud of its 1922 record as compiled by the Portland Cement Association. Out of 94 plants reporting, all of Lehigh's mills were among the first 30, and Lehigh was given a rating of 1st, 2nd, 3rd, 5th, 7th and 12th for its six best plants.

A Safety Committee is held one month of each year, and June was the month selected. Any mill going through this month without a lost time accident is awarded a prize. Safety Campaigns have been held for the past three years with the following result:

1921, the prize was a large mill pennant, won by 5 mills.

1922, the prize was a beautiful American flag, won by 10 mills.

1923, the prize was a large silver cup, won by 11 mills.

At the end of each year there is a trophy awarded to the mill making the best record for the year. The trophy offered for the last two years by the company is a beautiful bronze tablet, $4\frac{1}{2}$ by $15\frac{1}{2}$ inches. This trophy was won in 1922 by the West Coplay and Iola plants—there being

a tie, the trophy was left at each mill for 6 months of the year. In 1922 the trophy was again won by West Coplay, and remains with this plant as it was one of the rules governing the contest that the mill winning the trophy two years in succession might retain it.

The Safety Committee at each plant is also given a cash gift each year to do with as they see fit, each individual safety committee spending the money in whatever way they wish.

The Portland Cement Association has appropriated \$1,500 to be expended for a trophy to be given to the employes of the plant having the least number of days lost for 100,000 man-hours of work during 1923. This provides a new and added incentive for greater effort for safety.

In my opinion as an executive, safety work has become as necessary and essential to the successful operation of a cement mill as a boiler house or a laboratory.

You men who give particular attention to this department should congratulate yourselves upon the importance of your work. You should take hope and inspiration from this convention and go back to your plants filled with the kind of enthusiasm which will be contagious among your men.

DISCUSSION

Chairman Tagge: Gentlemen, I am sure we all appreciate the very fine paper Colonel Young has presented to us this morning. It should be a great encouragement and should stimulate us to greater effort to know that the executive of one of the largest companies is so thoroughly convinced of the value of safety work, and considers it an essential of the work of cement manufacture.

The Mitchell plant of the Lehigh Company operated 17 consecutive months without a lost time accident. That is certainly a very marvelous record. I have some figures from one plant with which I am familiar that shows a remarkable record also, and one that should encourage us. I have some figures covering the years 1920, 1921, 1922 and nine months of 1923. The accidents for those four years at that particular mill have gone down in this way: 51, 31, 15, and so far this year, 5. It is a large plant, producing some 10,000 barrels a day, and employing 600 or more men. We consider that a very good record.

Other things that stand out are the no accident months; that is, the months of the year in which there were no accidents; in 1920 there were no months that were perfectly clear, some accident, more or less, each month; in 1921, there were two months in which there were no accidents; in 1922, there were four months in which there were no lost time accidents, and in 1923, out of the nine months so far, seven months have had no lost time accident. I think that is a remarkable record.

Another thing in connection with this is the efficiency, the production per man-hour, or the man-hours per barrel, as I think most of you reckon that. We find that at this plant the efficiency has gone up right along and has kept step with the clearance from accidents. That is, as the

number of accidents decreased the efficiency of operation, the barrels produced per man-hour increased. These are facts that the executive cannot get away from, and he must be convinced by these figures that the accident prevention work, even from the standpoint of dollars and cents, is a paying proposition.

Mr. Frame (Alpha): I have some figures here bearing out what has just been said about the rates. At the same plant where there has been such an improvement in the accident record, the cost of accidents has also decreased. In 1920 the cost of accidents, that is, the compensation paid, together with legal fees and all other expenses was 1.33 per cent of the payroll. In 1923, for the first nine months of the year it has been reduced to 0.4 per cent or practically 30 per cent of what it was, a saving of 70 per cent in the actual cost to the company.

Colonel Young (Lehigh): I am going to add this thought. We see little children learning to swim with these little water wings or little life preservers. They ought always to be sure before they go into deep water that they have learned to swim. This question of self-insurance is similar. I would not recommend for anyone, for one minute, to take up self-insurance who does not feel competent and willing to look after the safety work, to instill enthusiasm in the men for it, and to follow it up every day in the year. Self-insurance, in those plants where we carry it, has paid, and we are well ahead of the game. In fact, I think you would be surprised if I gave you the actual figures, they are large. But, they would not be large, if we did not follow up the safety work every day in the year and every hour of the day at every one of our plants. In other words, don't start self-insurance unless you have enough confidence in your work along safety lines to win out. Better stick to your insurance company if you are not strong for accident prevention.

Mr. San Souci (Glens Falls): I have a plant that is not as good as it should be, I will admit; it is an old plant. I just want to ask if there are any fakers in your part of the country. I got along about two months without an accident. The next month we went along until the 30th of the month, and a man comes along and says he knocked his elbow against a crusher. We have to take his word for it and call the doctor. The doctor looks him over and finally the case goes before the Compensation Board. The Board allows him three weeks, but they also add there is a possibility that the man is faking the pain. We have no doctor. We stimulate all the enthusiasm we can in safety work, but about every month I have an accident or two.

INSTANCES OF MALINGERING

Mr. Robertson (Canada): That is something we very often run into. We call it malingering. We get a man who bumps his elbow and comes in saying he is feeling pain. The only thing to do is to examine that man and convince him that is not so. We find malingering mostly among new men who have been at the plant maybe only two or three weeks. If we had a big turnover of labor we could not show as good results as we do. The company encourages men to stay with us and probably to that is due the loyalty to the company on the part of the men. You will

find the older men around the mill will watch the new fellows and see that they are not malingering. We had a case where a man said a belt had broken and struck him on the head. We had him down to the doctor and found nothing. When we traced the case we found the belt had broken, turned over and touched him slightly without injuring him the slightest. He had received compensation three times before. We found that in reality he was not after compensation from us but he had personal accident insurance and that is what he was trying to collect on.

The great problem lies in the men. The safety engineer must have their cooperation and when the executive believes in the work you can generally convince the men. If a man has reported at our hospital for treatment and is not at work at 7 o'clock the next morning we go right out and investigate. One man was found taking his double windows down. He was supposed to have a hurt back. Another fellow was repairing his Ford. He was supposed to have an injured arm.

Major Reninger: We had one accident where a man was killed. Another man had been caught in a stone bin with him. This man claimed an injury to his arm—permanent total disability. Our doctor denied it, examined him, x-rayed him, and could not find a thing. We sent him to Indianapolis twice to two specialists. They all pronounced the man a fake. Even that did not satisfy him. We asked for a hearing. The hearing was held and the Compensation Board denied him any compensation. They had their own specialists examine him and decided that the man was a malingerer. On the basis of the past record of our company in regard to handling claims they placed the costs of the hearing on the man.

The main reason that malingering has been stopped almost entirely in our plants is due to the safety men keeping in touch with the injured men.

Mr. Saas (Universal): In regard to having trouble in getting men to report, every man in our plant is given a talk before he goes to work. He is shown where the hospital is. He is told what to do. He is told to report any scratches, no matter how small, to go to the dispensary and be taken care of. We tell the man about the clothing he wears. We tell him to try to save money. This system has worked out very well for us, and it might be a good thing for you to give the new man complete instructions before he goes to work. Don't let him come to work until he listens to the talk.

We have a lodging house at our place. When a man goes in there he is compelled to take a bath. He has to have a change of clothing. Otherwise he doesn't go in. Of course once in a while we get a refusal. We have some very nice lodging houses, two men to a room, two separate beds in each room, a recreation room, one for colored men and one for white men. We have a radio there. If a man wants to sit in the recreation room until 12 o'clock at night, it is all right. The lights go out at 12 in the recreation room and at 10 o'clock the lights go out in the rooms, and nothing is left burning except the lights in the halls, washrooms and

toilets. We only opened up the new lodging house the first of September. We found the men that caused the greatest disturbance in the other place had gone and the better class had stayed.

Mr. Fritz Johnson (U. S. Smelting Company): Our conditions are quite similar to the cement industry in regard to dust, acids, reactions on the skin, etc. In regard to malingering, about 90 per cent of our employees are located within a radius of ten miles of the plant. They practically all are owners of small farms. Seven years ago, when I first came to the plant, the condition of malingering existed. If a man had anything to do at home, if he had an acre to plow or planting to do he always managed to do some injury to himself so that he could take advantage to the compensation and farm at the same time, and malingering was very serious. We made a rule that when a man was injured and we figured he was malingering we absolutely refused to have anything to do with him. We fought him and gave that publicity in the plant, especially in the department where he was employed. Before the Workmen's Compensation Board of Utah the entire burden of proof of injury is upon the man. He is the plaintiff and the company is the defendant. In a six-year period my company has lost two cases before the Accident Board. The publicity given in the plant to the men that has malingered and tried to put it over has stopped all malingering. Today we practically have no malingering whatsoever in the plant.

We do have rupture cases. The Supreme Court of the state of Utah has made two rulings from different angles. Moorehead, who is recognized as an authority on traumatism, says that, in his experience of 10,000 cases of hernia, he never observed a truly traumatic hernia caused by injury. We base all our conclusions upon this fact, that when a man is operated on for hernia it is always found that there is a sac into which the intestine comes down. That sac has been there for years, ready to receive the intestine when it comes through. It was not formed in a moment. If you accept a man with a rupture and the man is doing heavy lifting and he strangulates the hernia, it is up to you to compensate. It is very, very seldom we have strangulated hernia. We operate on the man and send him back better than he came to us. Hernias are practically a thing of the past in Utah.

Chairman Tagge: Mr. Jacobsen is unfortunately ill this morning so we will postpone the discussion on Powdered Coal Hazards. We are fortunate in having Mr. Purkhiser with us this morning, who will switch his paper over to this time. Mr. Purkhiser talks on "The Human Element—the Important Factor in Safety."

THE HUMAN ELEMENT, THE IMPORTANT FACTOR IN SAFETY

H. H. PURKHISER, MASTER MECHANIC, LEHIGH CEMENT CO., MITCHELL, IND.

It seems to me that the question of personal safety in any other industry resolves itself at once into the personal element and the mechanical element—the man and the machine.

This is true, however simple the machine or equipment, for a man with a pick and shovel presents the same principal elements in simpler form, that are presented by a man and an automobile; a man and a grinding machine, a screw conveyor, and engine or any other equipment or mechanical appliance.

There is a very important difference between these two elements in that the one may be considered as having a more or less constant value and varies only from causes which can be seen or which can, with reasonable care and forethought, be anticipated.

A well guarded machine in good repair does not usually and unexpectedly become a poorly guarded and unsafe machine without some visible and usually preventable cause. But how about the human element? The very many things that may occupy the mind of an individual, matters foreign to the work at hand at the time, and which can not be known or anticipated by any one else, make of that workman a very inconstant and variable factor in the matter of his own personal safety or that of his fellow-workman—unless a proper guard can also be placed on him that shall, so far as possible make him a less variable and therefore less hazardous factor.

The few remarks I shall make are based almost wholly on our personal experience at Mitchell where we employ from 500 to 700 average men in two average cement plants, and the results we have obtained have led us to believe that our methods have perhaps some merit to them.

Like most, if not all, organizations who have undertaken an intensive personal safety program we considered first the matter of safe-guarding all machinery and making all places of employment safe places for our workmen, in so far as well guarded machinery and good equipment could make them safe, notwithstanding the fact that we had usually received a "clean bill of health" and many compliments in addition from state factory inspectors. We recognized even then that the education of our men in *safe practices*, in methods of carefulness, was an important matter but while we frequently talked to our men along these lines we had about come to the same conclusion that so many others had already expressed "As long as we employ large numbers of men in any industry we are going to have a good many accidents which can not be prevented." The number of days lost then by our employees as a result of injuries from accidents due to carelessness on their own part or on the part of fellow-workmen is a record of which we are not at all proud now, and even then we ranked fairly well with other cement plants.

The interest manifested in reporting unsafe practices among workmen led us to compare the records of the groups of workmen in the several departments and under the different foremen, some of whom had already made splendid records of many months without a single time lost accident, and right here is where we got the different foremen awake, by showing them their individual records for the past several months (number of accidents to men under his supervision), explaining that we expected to continue to classify according to the foreman in charge, and

that their efficiency would be judged not only by the amount of work done, but also by how safely they could do it. This idea seemed to be satisfactory and each one pledged to work for the best record, for not only did each foreman not want to have the worst record but all knew that they would have to account to the Safety Committee in some satisfactory manner for the larger number of accidents reported from their department or among their group.

And may I say that the foremen have a man's size job in training men in the importance of safety.

They should be sincere in every way and at all times.

They should make safety rules absolute and paramount, and commend those who follow the rules even to the simplest degree.

STANDING OF DEPARTMENTS

A classification of accidents by departments and groups brought out some astonishing records which hardly any one up to that time had realized, for it developed that some departments had gone well over a year without a single lost time accident, and this furnished another opportunity for interest and friendly rivalry, which we thought would be very helpful so we began to make bulletins showing the length of time each department had gone without an accident. The following list shows the standing of the departments as of October 1st:

Department	No. Men	No. Days
General Repairmen	8	1376
Raw Department	37	1349
Kiln Department	17	1350
Sparksville Quarry	24	1047
Coal Grinding Department	13	982
Power Department	24	958
Shop	60	907
Clinker Department	27	896
Woodworking Department	12	791

Another plan we used was that of listing the causes from which our most common accidents occur, and we discovered that grinding wheels, cutting and chipping, and small holes in the bottom of cement bags were the causes of most of our eye injuries. We at once agreed to make it compulsory to wear goggles when grinding or cutting and chipping, and also to wear goggles and gloves when pouring hot metal. Since that time we have not had another accident from these sources, and as to the holes in cement bags, it required only a few inspection trips by the committee to find that the bag sorters were unaware of the importance of not passing any bags to the packers with holes, especially in the bottom. With proper instructions that fault was soon corrected, with the result that we have had no more accidents scoring against us from that source.

The menace of coal dust explosion, outstanding as it is in many cement plants as the source of many serious accidents, has been entirely eliminated at the Mitchell Mills, due wholly to close observance of safety rules.

At last we had "rung the bell" for we had reached the men in a way that made them take an active interest in our safety program so that when on June 1st, 1921, we began our first No-Accident Campaign nearly every man was unconsciously a "watchdog" for unsafe practices. Right here let me say that you do not get a good start in a No-Accident Campaign unless you have created a live interest before the date when the campaign starts and after it has started keep in mind that there can be no "let up" in your efforts because the minute you do you begin to drift and you always drift down stream, not up, and for that reason we decided to adopt the school plan of holding regular classes for safety instructions. This we did, meeting once each week and bringing from 30 to 40 men together according to the number we could spare without interfering with our production, and there we reviewed the history of our safety work, explaining to each man that guarding the machinery did not reduce the number of days lost due to accident one bit, and made it plain to them that protection must be the first law and should be the motto of every man, pointing out that there is no justification for carelessness in an industrial organization and that they would get nothing out of accident prevention without putting work and life into it, telling them that we were going to watch and see whether things were being done right or wrong, that we would appreciate every effort for safety. This, I think, got "under the skin" and all through our meeting we tried to appeal to the men in such a way as to actually make them feel that they would be responsible for the accident if they knew the conditions to be dangerous and did not make an effort to correct same or report it to the foreman or a member of the Safety Committee. We often asked how do we know how many lives we have saved, families kept together, and ambitions prevented from being shattered, by our safety work. If any of you ever had the unpleasant experience of removing a fellowman from a screw conveyor or helping dig him out of a coal or cement bin, or have been so unfortunate as to have to notify his loved ones of the fatal accident, I am sure you would agree that it is time to do something to prevent the recurrence of such a tragedy."

A man who is careless and takes a chance with his own life can not be depended upon to protect machinery and property, but on the contrary if he is a thoughtful and careful man you can rest assured that he is a man who can be trusted with the care of machinery.

SAFETY MEETINGS AS DYNAMOS

I like to think of our safety meetings as a dynamo which is continually generating safety current to every man in the mill, which keeps them active and alert at all times, and for that reason we have never postponed or cancelled a single meeting for several years.

As long as the mill continues to make a record which is worth while it attracts not only the attention and interest of the men employed, but also the entire community, and men usually like to have a part in doing things worth while. To my mind there is absolutely no question about the statement that accidents can be prevented, as is shown by the record

of Mitchell Mill No. 2 for the past two years. In June, 1920, during our "No accident" month we had just one accident and that by "horse play"—one of the most persistent and also most inexcusable obstacles in the path of a good safety record. A water boy and fireman in the coal grinding department had a wrestling match, falling on the concrete floor and fracturing a bone in the arm of one of the men. Then in July and August of that year we felt that the campaign was over and did not make any special effort to prevent accidents, consequently we had more men hurt than in any other two months of that year.

In making up the 1922 safety program we agreed that we should analyze the reports of all time lost accident of previous years that we might know better along which line to work, and to our surprise we found for the past four years we did not have an accident which a mechanical guard would have prevented, and that *all our efforts had been toward making conditions safe for men, rather than making the men safe for the conditions.*

I am thoroughly convinced that the greatest lesson that can be taught to each individual workman is to keep his mind constantly on what he is doing and where he is going, which is just as important, if not more so, than safety devices.

The article written by Arthur Bristane and published in the November-December, 1921, Accident Prevention Bulletin expresses my sentiments very forcibly. It stated, "There is never going to be any guarantee for the safety of human life that is not based upon the human factor. It is well enough to invent safety devices but the best safety device in the world is intelligence. No amount of signs, notices, red lanterns machinery or policemen can save an absent minded man who will not look where he is going, from breaking his neck. Safety, in other words, along with many other things we think we can get by cleverness, can only be gotten through education. There is no short cut."

The ultimate aim of any safety committee should be to arouse an active conscious interest among all the workmen for a sufficient length of time to develop the *habit* of thoughtfulness and carefulness, for we are all to a large extent creatures of habit and do the right thing or the wrong thing as we have formed the right habit or the wrong habit. It is only as thoughtless, careless habits among foremen and workmen are wiped out and replaced by thoughtful, careful habits of doing work that any permanent value in safety and accident prevention is accomplished, for when once developed it is just as easy and natural for foremen and workmen to look about them and be, in a sense, unconsciously careful, as it is to begin and continue the work in a careless, thoughtless manner.

Thus step by step we enlisted the interest and active cooperation of our men until we feel we have developed among them to some extent at least, the *habit* of carefulness to which we attribute mainly our large reduction in all accidents, especially the more serious accidents, and we believe that we have awakened among them a deeper human interest in each other's personal safety and welfare, to prevent keen suffering.

and keep their fellow-workmen's wives from becoming widows and their children from becoming orphans, and at the same time establishing a record which we think is unequaled today in that of operating a mill employing 450 men, working 1,383,475 man-hours for a period of 17 months without an accident causing the slightest inconvenience to a workman.

FOREMAN IS HUB OF SAFETY WHEEL

We work through the foreman. We put the responsibility squarely up to the foreman in such a way that he is the man that leads the group. A foreman must be a man who is a friend to the men, who can meet John and Henry and ask about the wife or the kiddies or the folks at home. He should have an individual message for the man when he meets him. A foreman should consider himself an inspector, hourly going from department to department to see whether the work is done right or wrong, and be able to tell the man how to do it right. A foreman should be an inventor, constantly trying to simplify the work and make it safer and easier for the man. He should be an organizer who can hold his men and hold his place as foreman of those men. He has to be a hustler, a mechanic, knowing every phase of the work, so he can tell a man that the job is being handled wrong and why it won't work to do it that way. He must be a teacher, a leader, able to train the men in safe practices. We tell the foreman that the Lehigh is anxious to make all the cement possible but we don't want to make cement at the cost of his blood or the blood of others.

The foreman is in constant supervision of his men, with them at all times. If something is required he sends some one else to the storehouse, but he stays with his men.

We convene, say, every fourth Tuesday at 9:30 for a safety meeting, with every man on the job. We can't give the safety work on spare time and get anywhere. All of our most important men have time to come.

THURSDAY MORNING SESSION

Chairman Reninger: The first thing on the program this morning is the Report of the Nominating Committee that was appointed by Mr. Tagge yesterday.

Mr. Frame: We take great pleasure in nominating Major Reninger, of the Lehigh Portland Cement Company, and Mr. H. G. Jacobsen, Manager, Bureau of Accident Prevention and Insurance, Portland Cement Association, to be our chairman and secretary respectively for the ensuing year.

Chairman Reninger: That is rather an embarrassing thing and I am going to ask someone else to take the chair.

(Mr. Huth took the chair.)

Chairman Huth: Are there any further nominations for the office of Chairman? (There were none.) There being no further nominations, Major Reninger will be chairman of the Cement Section for the coming year.

Are there any further nominations for the office of secretary? (There being no other nominations, Mr. H. G. Jacobsen will be our secretary for the next year.)

(Chairman took the Chair.)

Chairman Reninger: I certainly appreciate the honor of being here again for the second term as Chairman of the Cement Section. I really appreciate it for the simple reason that I am absolutely sold on this safety game, and I believe that the cement industry, as a whole, is doing more good work in accident prevention than almost any other industry in the country. As far as I am concerned I shall endeavor to do all I possibly can to keep up the interest in the section and in conjunction with Mr. Jacobsen, as manager of our Bureau of Accident Prevention and Insurance, and under the leadership of Mr. Tagge, Chairman of the committee on accident prevention, I feel that the work is going forward and we will be able to do even better work this year than we did in the past. I hope that all of you have made careful examination of the Study of Accidents, as given in the July-August Accident Prevention Bulletin of the Association. You will learn from that Bulletin that we are improving right along.

The majority of the cement plants are doing a great deal of work, and I feel that when the report for 1923 is prepared by the Association we are going to see a great reduction in time lost during that period. I think that the trophy as offered by the Cement Association to the mill making the best record for 1923 has caused a great deal of rivalry among all the companies, and I know half a dozen companies that have done more work this year than they did the last four or five. It is going to be a close race.

I am sorry to say Mr. Jacobsen is still confined to his bed; his illness prevents him from being here today. Mr. Jacobsen's paper on "Powdered Coal Hazards" will be read by Mr. Frame of the Alpha Company. Mr. Frame is particularly able to cover this subject because the Alpha Company has always made coal houses a specialty and have some of the finest in the country.

POWDERED COAL HAZARDS

H. G. JACOBSEN, MANAGER, BUREAU OF ACCIDENT PREVENTION AND INSURANCE,
PORTLAND CEMENT ASSOCIATION, CHICAGO, ILL.

Coal dust explosions have taken place since the beginning of mining of bituminous coal, but such explosions were always attributed to gas and not to dust.

The controversy on the explosibility of coal dust is interesting and particularly to safety men because it shows how difficult it is to uproot an old ingrown idea.

In the published account of an explosion in a coal mine at Wallsend, England, on September 3, 1803, J. Buddle, chief of the Newcastle coal miners says: "The workings were very dry and dusty and the survivors

who were most distant from the point of explosion were burnt by the shower of red-hot sparks of ignited dust which were driven along by the force of the explosion."

Professor Faraday, the famous chemist and physicist, remarked in his report on the Haswell mine explosion September, 1844: "In considering the extent of the fire from the moment of explosion it is not to be supposed that fire damp was its only fuel. The coal dust swept by the rush of wind and flame from the floor, roof and walls of the works would instantly take fire and burn if there were oxygen enough present in the air to support its combustion."

On September 8, 1880, a terrible explosion occurred at the Seaham mine, County of Durham, England, which attracted general attention to the subject of coal dust.

In other countries, particularly France, Germany and Austria, investigations had gone on simultaneously with those in England, but as here without definite results.

ENGLISH REPORTS

On March 15, 1886, the British Accidents in Mines Commission reported the following facts as conclusively established:

- "1. The occurrence of a blown-out shot in working places where very highly inflammable coal dust exist in great abundance may, even in the total absence of fire damp, possibly give rise to violent explosions, or at any rate be followed by the propagation of flame through very considerable areas and even by the communication of flame to distant parts of the workings where explosive gas mixtures, or dust deposits in association with non-explosive gas mixtures, exist.
- "2. The occurrence of a blown-out shot in localities where only small proportions of fire damp exist in the air, in the presence of even comparatively slightly inflammable or actually non-inflammable but very fine, dry and porous dust, may give rise to explosions, the flame from which may reach distant localities where either gas accumulations or deposits of inflammable coal dust may be inflamed, and may extend the disastrous results to other regions."

In February, 1891, a Royal Commission on explosions from coal dust in mines was appointed and began hearing evidence. In its final report the Commission summarized their conclusions in the following words:

- "1. The danger of explosion in a mine in which gas exists, even in very small quantities is greatly increased by the presence of coal dust.
- "2. A gas explosion may be intensified and carried on indefinitely by coal dust raised by the explosion itself.
- "3. Coal dust alone, without the presence of any gas at all may cause a dangerous explosion if ignited by a blow-out shot or

violent inflammation. To produce such a result, however, the conditions must be exceptional, and are only likely to be produced on rare occasions.

- "4. Different dusts are dangerous in varying degrees, but it cannot be said with absolute certainty that any dust is entirely free from risk.
- "5. There appears to be no probability that a dangerous explosion of coal dust alone could ever be produced in a mine by a naked light or ordinary flame."

Although explosions occurred from time to time in various sections of this country it was not before 1907 that we had an appalling series of great wide-sweeping disasters. On December 6, at Monogah Mines, W. Va., occurred what was probably the greatest disaster in the history of coal mining in the United States, when 358 lives were lost. On December 16, at the Yolanda Mine, Alabama, 56 men were killed and on December 19, at the Dorr Mine, Pa., 230 men were killed. In this black month of December, 648 men were sacrificed, chiefly from the effect of coal dust, which if not the initial cause in all cases was the agent carrying death.

The coal dust question in this country cannot be said to have awakened widespread interest until the terrible disaster of December, 1907. In response to a demand by those interested in coal mining throughout the country, Congress, in 1908, made an appropriation for an investigation of mine explosions. A testing station was at once decided upon and was established at Pittsburgh, Pa.

While it is probable that for several years the leading mining men in this country believed in the explosibility of coal dust without the presence of fire damp, yet, until the public demonstrations were given at the testing station at Pittsburgh during 1908-1909 and reports were received of similar tests made abroad, a large proportion disbelieved.

The question of the day is no longer "Will coal dust explode?" but "What is the best method of preventing coal dust explosions?"

In coal mining there is a diversity of opinion as to what the term "coal dust" means; that is, how finely coal must be divided to be termed dust. Coal dust that will pass through 100-mesh screens is frequently accepted as mine dust. This fineness was adopted at the Pittsburgh testing station as standard. It must not be thought, however, that there is no danger in coarser dust. At Pittsburgh it has been demonstrated that propagation can be obtained with dust that will pass the 20-mesh screen.

In mines dust is a waste product and much is done to prevent its formation. In the cement industry coal dust is a manufactured product and its fineness is high, at least 80 per cent passing through the 200-mesh screen, which is equivalent to dividing a cubic inch into about 8,000,000 pieces.

It is a well known fact that when we start a fire the rapidity of combustion depends upon the surface exposed to the air. For this reason we chop our wood fine and see that there is a good draft when we kindle a fire in our stove.

COMBUSTION OF COAL DUST

An explosion is in reality nothing but the rapid combustion made possible by the material being finely divided and the presence of enough oxygen to support combustion. In explosives such as dynamite and gunpowder, the oxygen is supplied artificially through the chemical composition of the explosive material.

If we take a cubic inch of coal and ignite it it will burn very slowly even under the best air supply conditions. But if we take another cubic inch of coal and divide it into 8,000,000 pieces, supply air and ignition, then combustion of all the pieces will take place simultaneously and we have what we call a coal dust explosion.

While the idea of using powdered coal for fuel is not entirely new—we hear of experiments having been made with it as early as 1818—it can truly be said that it was not before its application in the cement industry in this country that its use was considered with any degree of seriousness. Prior to 1897, all cement was burned with oil. Mr. Hurry, engineer, and Mr. Seaman, superintendent, at the Atlas Portland Cement Company's plant at Northampton, Pa., after much experimentation introduced powdered coal into the cement industry in that year. Its use in other industries is rapidly increasing and during the last three or four years quite a few power plants have made use of it as boiler fuel.

The cement industry is the fourth largest industrial consumer of coal in the United States and by far the largest user of pulverized coal. The annual consumption of coal by the cement industry is exceeding 8,000,000 tons, of which more than 5,000,000 tons are pulverized and used in the kilns.

Having handled vast amounts of this dangerous material since the time when coal mining people were still disputing the fact that coal dust would explode without the presence of gas it is not surprising that we have records of quite a few accidents. That we do not have more can be attributed to the vigilance continually exercised in the cement industry against this hazard.

In the early years of the cement industry the coal mills were not so constructed that they could be kept clean without some effort and that undoubtedly is one of the reasons for several explosions at that time. Many coal houses have since been remodeled and new ones have been built so that, in respect to housekeeping, improvements have been continuous.

The coal mill should be in a separate building of fireproof construction, well ventilated and well lighted, both artificially and by daylight. Too much thought cannot be given to the design of new coal mill buildings or to remodeling and changing of old existing buildings.

Without going into detail, it should be stated that the drier room should be entirely separate from the mill room by a fireproof wall; that this has not been done universally has been the reason for several explosions and fatal accidents.

The entire building should be of fireproof material; all walls should be smooth with no projections of any kind, and the design should be such that beams, trusses, etc., can be entirely eliminated. Platforms and stair-

way should be of metal of some open designs such as subway grating so as to prevent the lodging of dust. To increase light and cleanliness it is a good plan to paint the coal house white inside.

The motors driving the grinding mills should as far as possible be placed in a special room separated from the mill room by a fireproof wall and emergency stop buttons should be placed outside the building as well as at various places in the mill room.

The grinding mills should be dustless and all screw conveyors and elevators should be so constructed that little or no dust can escape. In designing a new coal mill, provision should be made to place all conveyors except the one carrying the coal dust from the grinding mills, and elevator stacks on the outside of the building.

DANGER POINTS

Coal dust explosions at cement plants have taught us that we have several outstanding danger points to watch with particular care.

1. Cleaning of coal houses is dangerous because if the men performing this work are not extremely careful, it is very easy to stir up just enough dust to produce that critical mixture of dust and air which will cause an explosion even with the slightest spark. This spark may be generated by the coal itself through spontaneous combustion, or by careless handling of electrical equipment, or by the fire in the drier, if the previously mentioned precaution of separating the driers from the mill room by a fireproof wall has not been taken. Many lives have been lost in explosions which took place while mill rooms were being cleaned, the most horrible example being an explosion in 1911 in which nine out of ten men cleaning a coal house were burned to death. Many dust explosions occur in two stages—first a primary explosion, which is usually local; and second, a much more extensive and destructive explosion which results from the disturbance of the accumulated dust by the first explosion. When an explosion occurs in a clean plant where proper dust control methods are in use, nothing more serious than local damage usually results, but in a dirty plant the explosion may be propagated from point to point and result in extensive destruction of property and serious loss of life.
2. Numerous explosions have occurred while repairs have been made on some part of the coal house machinery. During such work it is very easy to dislodge a considerable amount of dust and the danger is enormously increased because the repairmen frequently need an artificial light close at hand. The danger is still further increased by the fact that many repairmen do not seem to have been instructed in the danger of coal dust. Not very long ago, we received a report of an explosion which took place while a repairman worked on an elevator, in the

coal house with an open torch. Incredible as it may seem, this practice is not uncommon and the conclusion must be drawn that the men have no knowledge of the danger to which they expose themselves and others. Needless to say that if artificial light is necessary, only an electric flash light or a fully enclosed and protected incandescent light must be used.

3. Carelessness in operating the coal mill is another point of danger. It may be carelessness or ignorance or a combination of both that sooner or later leads to trouble.

The coal drier which is found in the coal mill of every cement plant is entitled to the most careful attention because of the possibility of overheating the coal while it passes through the drier. The only way to keep close check on this danger is to take regular temperature readings; in fact, a recording thermometer should be used. Frequently coal houses are dustier than necessary because conveyors, elevators, grinding mills and other equipment are not kept in proper, dustproof condition. A conscientious mill operator with any regard for his own and his fellow-workmen's safety will not permit such conditions to exist.

It is well for the coal mill operator to remember that many of those explosions for which there are no proven causes have occurred immediately upon starting the machinery after a shutdown. The explanation to this may be that coal was over-heated in the drier during the shutdown or that the coal dust in some part of the system was ignited spontaneously. Many grades of coal will develop spontaneous combustion with unbelievable rapidity under such conditions as are present after even a short shutdown. Undoubtedly the most severe coal dust explosion in the history of the cement industry occurred some twenty years ago under such conditions. A small fire was discovered in an elevator. The fire was smothered by throwing pulverized stone dust over it. After a short time it was thought that the fire was out and the elevator was started up. Immediately a terrific explosion took place killing a dozen men.

SAFE PRACTICE IN THE KILN ROOM

The danger of coal dust presents itself not only in the coal mill proper, but also in the kiln building where the fuel is used. The coal conveyors and tanks should be given the same careful attention that similar equipment is given in the coal house. The conveyor should be tight and care should be taken that the tanks do not overflow. In the kiln room there is the added danger due to the ever present fire in the kilns. A number of severe accidents have been caused by coal dust being ignited either from the kiln directly or from the hot clinker.

Quite a few cement plants have never experienced a coal dust explosion. We like to believe that this is due to careful operation. There is, however, also reason to believe that at some of those plants coal is used which is not highly explosive. It is a well known fact that two kinds of coal are of the same chemical combination. One kind may be highly explosive in pulverized form and another may be almost non-explosive under normal

working conditions. The contents of volatile matter has a very important bearing on the explosibility of coal. Coal containing 32 per cent and over of volatile matter is particularly dangerous and the danger generally increases with the percentage. From this we must, however, not draw the conclusion that there is such a thing as coal dust which will not explode. All coal dust will explode under favorable conditions and to prevent accidents at cement plants this fact must be impressed upon the men.

In no department of a cement plant does the human element play a more important role than it does in the coal mill and education of the men to a proper realization of the dangers involved so they will handle coal dust with the same respect and care that they would give to dynamite, is necessary if coal dust explosions are to be prevented.

DISCUSSION

Mr. Frame: We had a very bad explosion in the Lehigh Valley district last spring. Four men were fatally injured. We would like to have some views and discussions on hazards in connection with coal pulverizing plants.

Mr. Frank L. Wanzer: In our plant where we pulverize the coal and then have elevators lifting it to a higher level, naturally dust is collecting all the time, and it is a source of anxiety and trouble to us. We try to keep the mill as clean as we can, but the dust is always collecting. I would like to hear from others as to what their practice is in respect to housekeeping.

Mr. Ball (Lehigh): Before you start cleaning see that there is no fire in your drier. Close your drier doors, then sweep the dust up carefully.

Several years ago one of our men went to toast a piece of meat under a drier and while doing that a big blast went off in the quarry. The dust in the coal house was shaken down and ignited by the drier fire. The man was badly burned and lost one eye. Good housekeeping is the idea. Keep the coal houses clean.

I have told my men that the first one I catch sweeping in coal houses with open doors on the driers will get his money at the office quick. I have caught some men smoking in the coal house. I didn't fire them but I had a good mind to lick them. A man smoking in a coal house might as well be in a powder magazine.

Mr. Purkhiser: We take every precaution in our coal drying department. Once a day at a given time each morning we stop the department, close the drier doors, don't allow any smoking or flame throughout the building, and we clean down our coal house. We have it open so that very little coal dust accumulates. We keep our mills closed as tightly as possible and by strict observance of our rules we have been able to prevent accidents from coal dust explosions. For twelve years, I don't think there has been a single time when we even came near having a coal dust explosion, but that is because we have stayed on the job and watched it and have been very cautious of the danger.

FIRING OUTSIDE OF COAL HOUSE

Mr. Hess: I am glad to say that we never had an explosion. When I came to the Dexter, 23 years ago, they had the drier fired inside the coal house, but it was not long before I said, "This must be changed; the firing must be outside." We fire from the outside and have no fire inside whatever. The thing is to keep the fire away from the inside of the coal house. We don't have windows in the coal house, it is all open and there are ventilators in the roof. If a man is cold he can warm himself outside by the coal drier fire. We have a little room there for them to go to. Good housekeeping, as John Ball says, is the only solution.

Mr. Frame: In the Alpha Company, in all our nine plants a long time ago we took all the motors out of the grinding room and put them in a special room. I think we all admit that it is a dangerous practice to have a motor operating in the grinding room. Many companies have gone further; they take all the coal house motors outside of the building itself. There may be a few special cases due to previous conditions, which will not permit taking motors out, but as a general rule, everyone appreciates that a motor should not be operating where it can come in contact with coal dust.

Chairman Reninger: I agree with you. All but one or two of our motors are out now. We have never had any explosions that we could trace to the motor or any electrical hazards, but we are putting all our wiring in conduits and enclosing all our electric lights.

Mr. Roth (Pennsylvania): The plant I am most familiar with has its motors, and, if I remember correctly, also switches outside the grinding room. Of course there would be no object in removing the motors and leaving the switches.

Mr. Frame: Are those motors DC or AC?

Mr. Roth: AC.

Chairman Reninger: One of the greatest hazards you can have in your coal houses is platforms, corners or angles where there can be an accumulation of coal dust that can be shaken down.

We have removed all woodwork, and today the only thing we are using on walkways where there can be an accumulation of coal dust, is subway grating. We find that gives a very satisfactory walkway that is fireproof, and no dust can accumulate.

In regard to our lighting systems, we are not quite complete with our coal houses, but expect to have all electric wiring in conduits and lights enclosed. The coal houses are open entirely, all the way around.

Mr. Frame: It may be of interest to some of you gentlemen to know that the Alpha Company has just ordered a complete dust collecting equipment of the Clark type, which is to be installed at our No. 3 plant. We are going to watch the results obtained from this system very carefully, and I feel pretty sure that if it comes up to expectations we are soon going to have a complete dust collecting equipment in everyone of our nine coal houses.

Mr. Purkhiser: At Mitchell, our conveyor which carries the coal dust from the elevators over to the kilns, the elevators, doors and discharge openings, all have gaskets. We try to confine the dust by using gaskets in all cases.

DISCUSSION OF MR. PURKHISER'S PAPER

Mr. Robertson (Canada): Mr. Purkhiser, I think you mentioned that whenever a new man is employed he is told what he has to do and safety is brought before him. How do you go about explaining what they have to do? We have a dual system of languages; quite a number of our workmen are French, but we can get at them all right for most of us know a certain amount of French, but there are Italians, Russians and others as well.

Mr. Purkhiser: At Mitchell we have very little foreign labor, 98 per cent of our men being American born, speaking the English language. We do not give any safety instructions when a man is hired. We leave that to the foreman. We expect our foreman to sell the safety idea to each man coming to his department; before he is given a job or told what to do, the foreman instructs him in safety and goes with him and shows him the job and how it is to be done. Then we expect the foreman to follow up that particular man and see that he is doing the work in the way he instructed him.

Mr. Palmer: How do you sell Safety First to your foreman?

Mr. Purkhiser: We sell it to the foreman almost like we teach our children. We dwell on it to the extent that they cannot get by and not enact safety. We first call our foremen together and explain the responsibility the foreman has in taking care of his men. When we have an accident we investigate, and the foreman reports how the accident occurred. If he says that he does not know, we tell him he is not performing his duty. He must give us full particulars, and in a short time we find each one is trying to keep his record clear. We don't handle it from the executive standpoint. We leave it to the Safety Committee. We make the foreman account to the Safety Committee. Of course, that does not come with one, two or three meetings; it comes after years of training.

We had a meeting, a foreman's meeting, last Friday, a week ago tomorrow night. Out of 36 foremen, that includes every foreman out of two mills and quarries, five of them had been with the company more than 20 years, 17 more than 15 years, and practically all of the remainder had been with the company more than 10 years. It is letting the foremen know that we judge their efficiency not only by the amount of work done, but also by how safely it is done that we have come to the point where we feel that the foremen are really carrying on our safety work.

Mr. San Souci (Glens Falls): All companies don't give the Safety Committee authority to deal with the foremen. The Safety Committee men get it in the neck, to be plain. I have been awfully discouraged

and if I get any gleams of hope from this gathering I will be glad. We may have six or seven of our foremen sold on the Safety question, but two or three look you over and give you the smile.

Mr. Robertson: The greatest importance lies in getting your executives in line. This work must start at the top or it will not grow and become a success. I use the electricians as safety engineers, or sort of inspectors, but of course, the superintendent of the plant is the boss. We have a fairly large mill. Each department has a foreman and sub-foreman. We operate a three-shift mill. We have meetings of the general foreman regularly. We talk safety first and then production.

It may seem like a big statement, but we were solidly of the opinion at the plant that if our accidents went down, our production would go up. I think we have proved that. The men get interested. The central safety committee and then the mill safety committee meets once every fortnight. The men are given a lot of safety information, are told to keep everything in good repair, and if they have any machines that seem to need a little fixing up they are asked to let the foreman know about it immediately. If our machinery is in good shape our production is all right. Our work has brought a good feeling between departments, one department cooperating with another.

What has interested the men most is the three-month no-accident idea. We tried one month, and we had no trouble with that. Then we thought we would go to three months, but it took us quite a long time to get the three months' period without any accident at all. When we go one month without an accident we hoist the flag on the pole. Everyone started to inquire what it was for and it gave us the opportunity to tell them more about safety. Finally, when we ran for three months without an accident, we had a special flag put up. Then we went another month and then did three months more. We now have three flags flying and hope to have another. Our aim is to go twelve months without an accident.

ADJOURNMENT.

Construction Section

October 2-3, 1923

F. A. DAVIDSON, Chairman

The Patent Scaffolding Company, Chicago, Ill.

W. F. AMES, Vice-Chairman

Manager, Insurance Department, McClintic-Marshall Company,
Pittsburgh, Pa.

C. H. ALMSTEAD, Secretary

Dwight P. Robinson & Company, Inc., New York City

TUESDAY MORNING SESSION

CHAIRMAN DAVIDSON: The Chairman wishes to report that during the past year we have had a few members who have shown signs of considerable interest. In general, we cannot brag about the increase in membership. A good many construction men have been so busy constructing this past summer that it has been hard to get them to lend ear to organized safety activities.

We will not consider this a report, but will pass on to the next item—
Report of the Secretary.

REPORT OF THE SECRETARY

A meeting of our Executive Committee was held at New York City, October 10, 1922, at which there was a general discussion of matters relating to the Section, and another at Chicago on July 6th, the principal discussion being the preparation of our program for this Congress.

The Section has been trying to have a Safety course incorporated with a building construction course in one of our leading universities and I take pleasure in quoting from a letter dated August 20, 1923, received from Charles H. Warren, Dean of Yale University, Sheffield Scientific School:

"I find myself entirely in sympathy with your suggestion that the subject of Safety should be incorporated as a subject of instruction in our new course of Building Construction. We have not as yet made the appointment of a man to definitely take charge of this work but as soon as that is done, I shall place your suggestion in his hands."

I hope that if there are any members here who can further this idea, they will give their full co-operation.

Chairman Davidson: It has been our custom from year to year to have on our program a speaker from the city that is our host and this year will be no exception. I take great pleasure in presenting Mr. A. J. Elias, of Elias & Son.

COMPENSATION LAWS

DISCUSSION

Mr. A. J. Elias: Prior to the enactment of the Compensation Law there was a great deal of discussion in regard to the matter, not only from the standpoint of employers and employees, but also from the standpoint of the general public. The argument in favor of the Compensation Law was that each industry should take care of its own casualties and accidents. On the other hand, those opposed to it felt that that would impose unnecessary burden on industry and at the same time would have a tendency to make employees very careless, and make them look at it in this light: that if they became injured, the employer would have to take care of them anyway.

I think that both of these arguments have proven true. On the one hand, the employers have been obliged to go to great expense in getting machinery that is thoroughly safeguarded; sometimes the guards interfere to some extent with the efficiency of the machine. They also have been obliged to go extensively into welfare work.

So far as manufacturing plants are concerned, I believe the operators are taking every means they possibly can to prevent accidents, because it is to their interest to do so, irrespective of the humanitarian aspect of the case.

It occurred to me, in thinking this thing over somewhat, that it might be a good plan if the architects in drawing up their plans for construction of a building would include also in their specifications the methods along which that construction could proceed and the appliances that should be used, not necessarily specifying any particular appliance, but stating that certain appliances should be used, or others equally as efficient. That, I think, would put the contractors on a better footing because a responsible contractor would naturally figure the expense of using safety appliances while the irresponsible contractor—who probably expects to have one or two jobs and quit—would not figure in his estimate of cost all of these contingencies that the responsible contractor would. So if the architect specified the method of construction and went into some detail along that line, I believe it would be beneficial to the contractors.

Accidents in construction so far as I have been able to notice have been mostly due to the use of improper scaffold planking, carelessness in allowing old boards and things having nails in them lying around, and carelessness of men in standing under loads that were being hoisted. I have also noticed a good many accidents occur in excavations by reason of the sides not being properly shored up.

There is no question in my mind but that the Safety Council has done a great deal of very good work in preventing accidents and the slogan "Safety First" which you see all over the country is no doubt the result of your efforts. While the Annual Congress is being held in Buffalo, the results that come from it will not be local by any means but the result will undoubtedly be universal safety throughout the United States.

Dr. L. W. Chaney (U. S. Department of Labor): It seems to me the suggestion of Mr. Elias with regard to the co-operation of the architects in dealing with this problem is an eminently good one, and that if this Section were to send the American Institute of Architects an expression of their opinion with regard to what the architects might do, it might be very useful. I want to urge that you don't let that suggestion which really has a good deal of force in it, dro pright here.

Chairman Davidson: That certainly is one of the outstanding points that impressed me, too, as Mr. Elias spoke and I am glad Dr. Chaney brought it up. As an official way of putting that before the American Institute of Architects, would it be proper for this group to pass a resolution that we could in some formal manner send to that organization? If that suggestion is thought well of, I would be very glad to have some one move that such a resolution be sent.

Dr. Chaney: I offer a motion that the officers of the Association be instructed to communicate with the American Institute of Architects with regard to the incorporation in architectural specifications of some provisions with regard to safety.

The motion was regularly seconded and carried.

CONSTRUCTION CODE

DISCUSSION

Chairman Davidson: The balance of our session today will be devoted to the Construction Safety Code. This code comes under the auspices of the American Engineering Standards Committee and is part of a very large plan, not only covering safety, but many other fields. Our particular portion is safety in the construction industry.

Since the compensation law started great stimulus has been given to the application of safety methods by states and one after another the states have worked out codes of one sort or another. Other states are falling in line right along. Obviously, there was a danger that even a series of adjacent states would have conflicting codes. The purpose of this work was to standardize such legislation and also to offer a model code for states which had not yet started to work on codes. We want to be able to say to those states,

"Here is a model code which has been found good in other places. Why spend three or four years making investigations trying to get out a code that will be different when you have right here a code that has been designed to be followed, and is being followed in other states?"

This code work is carried out on a sponsorship plan. The National Safety Council was the sponsor for this Code. It was their business to

organize the Code Committee and to get on that Committee interests from all over the country representing the different groups that would properly be interested in such a code such as architects, engineers, contractors, legislators, and so forth.

That Committee was organized at Milwaukee in 1920 and this we see here is the development that the Committee has made up to date. It is approaching the final state and we aim to have here what might be termed a public hearing for the sake of getting at this time as many final suggestions as possible.

At the time the Code Committee was organized, Mr. F. L. Hurlbutt was elected chairman and he has continued in that post. It is therefore proper for me to turn the meeting over to Mr. Hurlbutt.

Mr. F. L. Hurlbutt, Chairman of the Code Committee, assumed the Chair. . . .

Chairman Hurlbutt: The first portion of the Code that you have the galley proof of applies primarily to building construction, that is, the erection, alteration and removal of scaffolds and other building equipment. It was the intention of the Committee when appointed in Milwaukee to ultimately get out several other portions which would deal with highway construction, hydraulic work, dam work, bridge building—covering the general field of construction as thoroughly as it seemed necessary to do. In these various branches of construction there is a great deal of similarity, but there are certain specific hazards, particularly on hydraulic work, where there are essential rules to be laid down which perhaps do not properly fit in Part One. So it is the intention of the committee, following the adoption of this Code in its final form, to start on another one of the branches of construction safety work.

SAFETY EDUCATION

The Committee was faced at the outset with the question as to whether they should include in this Code safety education. That is a pretty broad subject. Some people will argue that it has been standardized. Certain methods have no doubt been standardized in some industries, but certainly not in the construction industry. The question came up as to whether or not that properly belonged in a code of this kind and the Committee, after giving it a good deal of consideration, decided that it did not. They did feel, however, that they could properly include in the Code an appendix which would give suggested practices—good construction practice—and let it go at that, feeling that such bodies as the insurance companies and the National Safety Council, who have gotten out a great volume of literature on safety work in the construction industry and industry in general, could more properly give this information to the contractor and to the states than a Code could. I don't think, from my own experience, the average state wants to include safety education in its code.

Mr. E. W. Bush (Aetna Casualty and Surety Co., Hartford, Conn.): The purpose of the Code is to prevent accidents on construction work and it seems to me we should by all means have an appendix which outlines

to the uninformed superintendents, foremen, and contractors what they should do to prevent accidents on construction work, instead of merely giving them an arbitrary code stating that all scaffolding shall be of a certain size and strength. Unless you can get the idea of safety over to the man, you have missed your point. The matter of organizing Safety Committees is a very important thing. We have standardized practice regarding organizing for preventing accidents in industrial plants but we have nothing along that line in construction work. Very few contractors around the United States put up any bulletin boards. The large contractors, like Thompson-Starrett Company, James Stewart, Dwight P. Robinson, and others, are thoroughly sold on safety, and you will find them very well organized, but we find that the average contractor who is handling from one hundred thousand to one million dollars worth of work a year is not organized. The insurance companies haven't any standard on construction work that is common to all the companies.

We should include in the appendix something as to how safety committees should be organized and take up, I think, certain distinct departments of construction work and offer suggestions for the prevention of accidents with regard to that, very much along the line of what has been so admirably prepared by this Committee in the appendix.

Mr. E. C. Harding (Ferro Concrete Construction Co., Cincinnati): Any code will more or less fall flat unless you can get it over to the individual workman. You might publish volumes of mandatory orders, suggestions and principles to be applied and followed out in the construction industry, but if you haven't the cooperation of the men themselves—the individual workmen, the carpenter, the laborer, the bricklayer—I think it is likely to fall flat.

Just the other day I was out on one of our smaller jobs. The carpenters had a pair of brick horses which were about a 10 to 12 foot span, and on that they put a 1 by 10 scaffold plank, and a man was going to get out on it. I said to him, "Is that strong enough?"

He said, "Yes, it looks pretty strong to me." He got up on it and tested it out. There was a little crack in it.

I said to him, "Don't you think you had better put two on there?"

He said, "Well, we are going to use this just to put this beam up in place."

I said, "Yes, and suppose that breaks when you have the load of the beam on there in addition to you."

He said, "Well, I never thought of that."

I think there is one of the places to start. It is true we are going to have a safety code in Ohio. If that thing goes over in its present form, the contractor is going to suffer for the negligence of his employees. So that I think the most important work of a Code Committee, as far as the contractor is concerned, is getting over the safety idea to the man himself. The superintendent on the job orders the scaffold to be built; he may look it over in general. He doesn't see the hidden knot; he doesn't see the dry rot or whatever may be in the planking. It is the man who does the work himself that we have to get to first.

Chairman Hurlbutt: The National Safety Council is the one source which can put out literature, bulletins, and what not, of information to the workman. That is distinctly beyond the scope of a code.

Mr. S. J. Williams (National Safety Council): Mr. Bush, would you advocate the safety committee on construction jobs?

SAFETY COMMITTEES ON CONSTRUCTION JOBS

Mr. Bush: Not always. I think sometimes if we appoint a good level-headed, experienced carpenter and call him the Safety First Man, and let him go around and make trips at stated intervals, it is just as well. He could go around in the morning and in the afternoon and see that everything looks well; he would be a committee of one. On larger work, it is very desirable to have a meeting of the foremen, of not only the main contractor but all of the subs.

I have seen that worked out in one or two cases where the steamfitters, for instance, came on the job without any scaffold planks and they picked up odds and ends if they needed scaffolds; they would swipe the boards from the other contractors and put up some pretty queer and weird looking constructions to do their work. They were invited to attend this meeting, which came at eleven o'clock every Friday morning. And when this foreman of the steamfitters, who was a sub-contractor, got acquainted with the other foremen, and they were all working for safety, there were comments made on the appearance of their scaffolding and so on, and the next week conditions improved. The second week the sub-contractors were using just as good scaffold lumber and they were borrowing it, but they were borrowing the good stuff rather than swiping the poor stuff.

The safety of the job was improved as a result of these foremen meeting, and they also did a good deal to create esprit de corps among the entire bunch of workers to the end that the building progressed faster, that is, the building work.

(The chairman then read and explained the various provisions of the code and these were generally approved.)

Dr. M. G. Lloyd (U. S. Bureau of Standards): Mr. Chairman, might I call attention to paragraph 150? I want to suggest that there be added to the items specified there, "The spread of the legs of the horse to be, say, not more than one-fourth of the height."

Mr. Bush: I would suggest that the Code be so worded that this spread at the bottom is a function of the maximum height to which the extension can be made.

Mr. Robt. McKinley (General Builders-Assn., Detroit): I think we should put a limit on the overhang of the plank, because if you have a 6-foot span, between brackets, some one is liable to come along and put on an 8-foot plank and then walk down to the end of it and tip it.

Mr. W. A. Dearborn (Federal Mutual Liability Insurance Co., Boston, Mass.): Mr. Chairman, under 154, the use of squares is limited to three tiers in height. Wouldn't it be wise, under 151, to indicate some limit in the number of tiers, as a safe practice for horse scaffolds?

Mr. Nash: Our New York Code forbids the use of horse scaffolds more than 14 feet high.

Mr. Woedtke: I recommend to the Committee that instead of limiting the number of tiers, it consider a maximum height of all tiers combined, as Mr. Nash has just brought out as the practice in New York State.

Chairman Hurlbutt: I would suggest that we put in both because every time we build a tier of horses, there is the possibility of inequality in the length of leg.

SCAFFOLD SWAYING

Dr. Lloyd: Mr. Chairman, shouldn't there be something in Section 17 to prevent the suspended scaffold from swaying out from the building?

Chairman Hurlbutt: That is a good point. However, in most cases of suspended scaffolding, the weight of the scaffold and the material and load upon it are such that even with a pretty high wind you get very little sway from the building. It is the simplest thing to lash it because the framework which houses the drums can easily be tied through a window.

Mr. Bush: Section 18 states the size of the planks that shall be used. Wouldn't it be well to state that at least two planks shall be the minimum width of a riveter's scaffold?

Mr. Enoch Carlson (Chicago Bridge & Iron Works): Two planks are customary for scaffolding for riveters, except that they will naturally remove one in order to save time. It is a perfectly rational thing to ask for—two planks.

Mr. Bush: Section 19—if you get a lot of clay on runways in damp weather, you will have a slippery condition. I would suggest putting a cautionary note in there that they be kept clean and sanded, if slippery.

Mr. Owen Robert Jones (Aetna Life Insurance Co., N. Y.): With regard to the location of these boilers, in New York City we have a great many accidents due to the location of these boilers in the street. There is attached to these boilers the hoisting engine, and that means the hoisting rope is extended from the building across the sidewalk into the street proper. I think in formulating this Code we ought to specify very explicitly the location of these boilers. They ought to be, if practicable, in the building and we should make a general statement as to location. I think we should say that this boiler and engine should be removed from the street as quickly as possible. We have the additional hazard of all kinds of vehicles coming in contact with the boiler.

Chairman Hurlbutt: I see no objection to meeting Mr. Jones' suggestion in this way: we could insert a sentence which would say where local conditions are such that it can't be placed any place except in the street, proper guards surrounding the boiler shall be provided, in the form of railings or whatever is felt necessary.

Mr. Bush: Especially covering the transmission rope.

HOISTING MACHINES

Mr. Lloyd: In Paragraph 301, there is a requirement made for the brakes of a hoisting engine, which appears to indicate the minimum torque of the brake. I would suggest if that be covered at all, the value should be more than the load which the engine may carry, or its rating, say. In similar cases such as crane rules, and such places, the value is usually put at 150 or 200 per cent of the load.

Mr. McKinley: I see in Paragraph 302 you have a clause "Protection of Operator." I think the entire machine should be covered, and more especially the cables where they lead from the drum, the shift and the tower.

Chairman Hurlbutt: That is what we are going to answer in covering Mr. Jones' question.

Mr. Jones: Mr. Chairman, I think we ought to require that each tower guy should be fashioned with independent dead men. I notice here that it specifies one guy for each post every 32 feet. If all the buys are fastened to the same dead man and something happens to that particular dead man, that tower is going to fall.

Chairman Hurlbutt: As a matter of fact, I really think when that Paragraph 316 was drafted, we paid more attention to the tower that adjoins a building, 5 or 6 feet from the building. But I still think your point is absolutely right and we want to put it before the committee to include such a provision.

Mr. Bush: Mr. Chairman, I had in mind to offer a suggestion that we show a few well-designed dead men and then make reference to it in this clause here, and on hoist towers, and also on derricks.

Chairman Hurlbutt: Will you be good enough to try and give us a sketch?

Mr. Bush: I will do something on it.

Mr. Cedric B. Smith: Mr. Carlson says we can get a number of pictures of dead men.

Chairman Hurlbutt: Will you be good enough to send them to Mr. Williams?

Chairman Hurlbutt: Mr. Williams, will you make a note to have the committee consider the possibility of establishing a minimum angle for tower guys?

Mr. Dick: Bear in mind in specifying any angle of guys that a great many times you put a post under the guy in order to get a quick break into the ground or into your dead man, so that angle of the guy doesn't mean anything.

Mr. Williams: We recognize that towers can be designed to carry a bending moment or anything else you want to throw into it. On the other hand, many of the smaller contractors would put up a tower without any bending moment, and then might buckle the tower by throwing the transverse strain into it. I think we could easily re-word paragraph

317, without discussing the exact wording here, so as to cover both of those cases. That is, this transverse load should not be thrown onto the tower unless the tower is designed to carry it.

Mr. Dick: One of our superintendents in the last few days gave me a recommendation on a combination toe board and sliding bar, on the open side of the material hoist. We haven't tried it out but it sounded to me like it would be practical.

PLATFORM HOISTS

Chairman Hurlbutt: The next paragraph is also an essential one; I am going to read it: "All cars of platform hoists shall be substantially constructed and shall be provided with covers either solid or of wire mesh, of not less than No. 10 wire and not over 1½ inch mesh. Sections of the cover may be arranged to swing upward for handling bulky material. The floor of the car shall be at least 2 inches thick."

Mr. McKinley: I don't see why it is necessary to cover a hoist if you are not allowing the men to operate on it. I think you are just putting an additional hazard on the hoist by putting a cover over the top of it.

Mr. Williams: How about the man loading wheelbarrows on that hoist, at the bottom? He has to put his head nearly out into the opening. That is the reason for the provision.

Mr. McKinley: I see the reason for it. We had an accident not so very long ago where a fellow rode on a hoist against orders, and as they started down, he jumped off and the roof of the hoist caught him and killed him.

Chairman Hurlbutt: I think we would be likely, however, to prevent more accidents by putting the grille on than by leaving it off. I think the type of accident you mention is less likely to occur than accidents to men who are putting stuff on the platform.

Mr. Nash: That is a requirement in New York State.

Mr. Bush: What is the committee's requirement in regard to men riding on hoists?

Chairman Hurlbutt: That is covered in the next paragraph: "No person shall be permitted to ride on any hoist, concrete bucket, scale box, derrick hook, or any other hoisting device, except as provided in Paragraph 325."

That is a hard thing to enforce always, gentlemen, and the Committee would like an expression of opinion from you as to whether it is entirely feasible to attempt to put it across. The Committee feels that it is.

Mr. Dick: Mr. Chairman, I have thought a lot about that, and I have always felt that we would eventually work out something that can be enforced. If you don't enforce it, you can't put enough safeguards on an elevator to stop accidents.

Chairman Hurlbutt: Am I to take it that that is the consensus of the meeting? Apparently so.

Mr. Bush: Mr. Chairman in 330 you state, "Holding down guys should be installed, to avoid pulling off the gooseneck." Why can't you pull off the spider at the top, if you have a very long boom?

Chairman Hurlbutt: Perhaps one of the two gentlemen from the Chicago Bridge Company can give us some data on that.

Mr. Carlson: I will say that as far as the gooseneck or the master-plate, or whatever kind of derrick you happen to have is concerned; I never saw one pulled off.

Mr. Lloyd: Mr. Chairman, I have a suggestion to offer to Mr. Mitchell—to substitute the word "pintle" for "gooseneck."

Mr. Williams: To answer Mr. Bush's suggestion, there is this difference theoretically at least: that the spider on the guyed derrick is held down by guys in all directions, which would at least help to keep it from coming off. Of course, you might if you put enough force on it lift the spider up anyway, but your guy is pulling it down.

Mr. Bush: If your guys are slack and you are hoisting with a high boom, if the booms are longer than the mast, you bring a strain on all the fittings at the top mast.

WEDNESDAY MORNING SESSION

Chairman Davidson: The first subject we will take up this morning will be one that was postponed from yesterday morning—Report of Statistical Committee and Discussion of Comparative Records of Construction Section Members.

For a number of years, we have been working toward obtaining some system of compiling accident records whereby various construction companies could be put on the same standard system of rating so that we could get together and compare results and see whether we were making progress, see whether we were better with respect to accidents than the other fellow, or as good. And those who had been keeping records of their own in various ways, when they came here and tried to see how their records matched up with the other fellow's, had a feeling of disappointment from year to year; they couldn't tell what they were doing. But after working at it over a period of three or four years, we finally arrived at a standard system and last year was the first year that we were able to send out in advance of our meeting and get accident records from construction companies, and have them before us on a comparative basis.

Therefore, this report of the Statistical Committee is of special interest because it represents something that we have never been able to do before. The Secretary will read that report.

REPORT OF STATISTICAL COMMITTEE

C. H. ALMSTEAD

1. Statistics show executives the number and causes of accidents which are occurring and enable them to grasp clearly the waste and loss of efficiency which accidents represent. Only when facts regarding accidents are presented in an exact concise form instead of in a general

way can busy executives be reasonably expected to realize fully the importance of the accident problem and its bearing upon the well being of their employees and productiveness of their business.

2. Statistics show operating executives and safety men where accidents are occurring and from what causes, so that they may know where to concentrate their efforts for prevention.

3. Uniform statistics will enable members to compare their accident records and promote friendly rivalry among different members to achieve good accident records.

4. Proper statistics will show the causes responsible for the greater number of accidents which will help to direct our effective prevention measures and make headway in reducing the frequency of accidents.

5. Concerns which have been most successful in securing the interests and co-operation of executives, foremen and workmen in accident prevention are practically, without exception, those who have a thorough system of recording accidents and who have devised means for presenting these records in an interesting form.

6. With accident records of all members on a common basis, the combined experience of all members can readily be analyzed in a scientific manner and the principal hazards in the whole construction field could be fairly definitely determined.

At the meeting of the statistical committee held in New York on February 13, 1923, there was a discussion relative to more co-operation in obtaining uniform statistical data, so that the section would have an effective method of comparison. It was also thought advisable to standardize on an accident report form. In addition to enabling members to prepare their accident records in a uniform way, it was thought such a form could be used to advantage in creating friendly rivalry among the members of the section. It was also decided that the chairman of the statistical committee write to the members of the section and bring this new form to their attention and ask that more co-operation be given this important subject.

Shortly after the meeting in February, the chairman of the statistical committee resigned, so that the matter of statistics was, perhaps, not given the attention it should have had.

During April and May, the chairman of the section communicated with the different members asking them to send their accident statistics to the National Safety Council for publication in the *National Safety News*. As a result, seven construction companies and five structural steel erectors and fabricators responded and the first tabulation experience of Construction Section members was published in the "National Safety News" for July, 1922.

STATISTICS ARE PRESENTED

In going over the totals for the seven general contractors we find the average number of employees totaled 7,188.

Number of hours worked	17,527,467
Number of lost time accidents.....	1,268

Number of days lost	101.214
Frequency rate or number of accidents per hundred thousand man-hours worked.....	72.37
Severity rate or number of days lost per thousand man-hours worked	5.775
Number of deaths	11
Number of permanent injuries	12

The totals and averages for the five structural steel erectors and fabricators who reported statistics for 1922 are as follows:

Average number of employees.....	1,509
Number of hours worked	3,949,445
Number of accidents	564
Number of days lost	21,421
Frequency rate or number of accidents per one hundred thousand man-hours worked.....	142.82
Severity rate or number of days lost per thousand man-hours worked	5.421
Number of deaths	2
Number of permanent injuries	5

It will be noted that the number of companies covered is not large in comparison with some of the other sections. Unfortunately, there is no method of comparison with other years, inasmuch as this is the first record of this kind compiled for the construction industry. The average rates, both frequency and severity, are higher than the rates for any industry tabulated by the National Safety Council. It would appear, therefore, that the Construction Section has not given enough attention to safety, as compared with manufacturing industries. If we console ourselves with the fact that our work is so widely scattered and constantly changing in location and character and presents a different problem from a permanent plant operating at a fixed location; then we should put more effort in our accident prevention program.

The statistical committee for the years 1920 and 1921 presented some very interesting reports on uniform accident statistics and a list of causes for use in classifying accidents on construction work. These reports covered the subject very thoroughly and we owe it not only to ourselves but to the committee who prepared them to make the best possible use of them. Surely, with a uniform method of compiling statistics and by keeping systematic records, we can arrive at the principal hazards of the construction industry and can then concentrate our combined efforts on effective accident prevention.

Some of us will recall that yast year at the Detroit Congress a paper was presented to the Section entitled "Keeping Records of Accidents According to Causes." It was brought out in this paper that only seven members were classifying accidents according to causes and that five were using the standard classification adopted by the section.

I sincerely hope that more members are adopting the standard method of compiling statistics, for if we want to attain success in our accident

prevention program, let us accumulate adequate accident statistics, so that we will be in a better position to reduce our present high frequency and severity rates.

To do this effectively, we need more than the co-operation of seven construction companies and five structural steel erectors and fabricators—we need the co-operation of the entire section—and members are urged to look into this important subject, so that when we answer the 1923 roll call for statistical data all members will be included in the tabulation with their records on a standard basis.

CONTRACTORS' ASSOCIATIONS' ACTIVITIES IN THE REDUCTION OF ACCIDENTS

RALPH A. MACMULLAN, SECRETARY, GENERAL BUILDERS ASSOCIATION OF
DETROIT, MICH.

To some of you I presume this talk will be largely repetition of previous messages to the National Safety Council from the General Builders Association of Detroit. Our association was very enthusiastic and active in the formation of the construction section at St. Louis, and since then we have been diligent in our attendance at the subsequent conventions at Cleveland, Milwaukee, Boston, Detroit, and now at Buffalo. We believe that since "eternal vigilance is the price of success," what might be regarded as repetition may properly be understood as confirmation of our conviction that safety methods for the construction industry are not only humanitarian, and economically correct, but practically obligatory after you become convinced, as we are, that organization along this line and the control of accidents is the surest and most indispensable step toward efficiency of production, and efficiency of production is necessary in the present situation of labor shortage.

The General Builders Association of Detroit is composed of seventeen members who have become so completely and permanently sold on the subject of accident safety and prevention that they are imbued with the common interest of working together in complete co-operation. The Association has a safety committee composed of one man from each member firm, the secretary of the association, the insurance representative, and the chief inspector. This committee holds periodical meetings, both regular and special, for discussion of all matters that have to do with safety. The scope of its deliberation is broad enough to include amendments to the compensation law, important decisions on the subject of public liability, owners' and contractors' contingent liability, the subject of equipment, materials, and methods of handling them, and the like. It was this committee that actively prepared, approved and adopted the safety code of the General Builders Association of Detroit, which has been used as a creed by our members and with which many of you are familiar because it has been re-published and distributed rather generally throughout the United States and Canada.

To promote familiarity with our safety code and its intelligent application to safety problems on the jobs, our association appropriates, each

year, a sum of money to be expended in bi-monthly installments as prizes for the best answers to questionnaires embracing ten questions that are distributed among superintendents, foremen and others on the jobs. These prizes range from \$15 down to \$1, with additional prizes given for helpful suggestions whether they apply to the code or not.

KEEP ABREAST OF LATEST METHODS

The result of this questionnaire has been exceedingly gratifying and indicates that men on the job are very much interested in helping their own situation, to say nothing of the helpful propaganda of convincing the employees that their employers are actively interested in them as evidenced by the attempt to save life and limb and preserve the men to their jobs. We cannot afford to overlook any possibility of betterment of our safety work by suggestions from the men actually on the job, and, further, the very thought given by the men to suggestions gives them what might be termed a "safety consciousness," whether their particular suggestion is of value or not.

The program of our safety committee is one of constant change to keep abreast of the best and latest practices and methods, and particularly designed so that the subject shall not become commonplace or stale, and naturally is too extensive to permit of detailed reference here. One of the first and best details of that program, however, is the practice at times of holding periodical first aid classes showing practical methods of caring for accident cases and the education of one of the foremen or superintendent on each job in first aid work as well as that feature, perhaps more important, of impressing the participants with the conviction that an accident is a mighty good thing to prevent before it happens, and, how to minimize the result of it when it does occur.

As a valuable adjunct to the work of the safety committee is our welfare department wherein a trained nurse visits the home of each workman whose injury requires hospital attendance. This nurse prepares a form provided for the purpose in which is noted information relative to the size of the family and general information about home conditions. If need of special financial or other help is indicated by the information gathered, we proceed from that point according to the merits of the case. Thus, a woman is given the task of breaking the news of the accident to the family of the injured workman, as only a woman can do. Next, the nurse visits the hospital and informs the patient that she has been to his home and has rendered such comfort and aid as has been necessary, and gives the patient such assurances that he is relieved from worry about his family and home.

In case of an accident of more than ordinary gravity on any job, whether it be attended by severe results or results only potentially severe, the association convenes a board of inquiry consisting of the secretary, insurance representative, the chief inspector and the safety committee man in the employ of the member firm on whose job the accident occurred. As soon as practicable after the accident, the board visits the job, whether

it be in Detroit or elsewhere, and takes informal testimony from eye witnesses, the injured workman, if possible, the foreman and superintendent. I use the word "informal" because we invariably begin by stressing the fact that all present are there for the purpose of discovering how such conditions may be promoted as will effectually prevent a repetition of such an accident and therefore they may all speak freely. The effect of this practice is very excellent in many ways, particularly in re-establishing confidence and, therefore, efficiency on that job.

CO-OPERATE WITH COUNCIL AND U. S. DEPARTMENT OF LABOR

All of the foregoing will indicate to you that the systematic methods that we have developed and adopted for the control of accidents have resulted in a sort of unwritten book of standard rules and processes among the association members, and the various jobs of each member. Standard methods, plus discipline, its first cousin, must surely result in efficiency. and it follows just as naturally that efficiency based on organization and system makes for minimum accident occurrence. This, in a word, is success which in safety work means humanitarianism, economical as well as physical safety to workmen with a resulting speed and economy to both the owner and the contractor.

Without statistics of a high order, our work in safety methods could not be capable of being measured. To this end, we have worked carefully with the United States Department of Labor, the National Safety Council and others to perfect and adopt standard methods of accident accounting, and the adoption of forms with standardized nomenclature of cause and result of accidents with standardized penalties in elapsed days for fatal and permanently disabling accidents. I believe a great deal of credit for these standardized methods of accounting is due to the National Safety Council because it is now possible to make results in one section comparable with those elsewhere, and is an inestimable help to those who are making a sincere and intelligent effort to reduce industrial accidents and their results in the construction industry.

I wish to repeat what I said in the beginning; that our members have been so completely sold on the subject of accident prevention among employees through the methods outlined in the foregoing that they regard it as an essential department of their business along with economy and efficient handling of any other department. Safety is not the privilege of the large contractor, for he has no patent or special advantage over the small contractor. Nor do we agree that the phrase I dimly remember, "a death a floor" should be stoically accepted, for while we occasionally have deaths, we have completed many multiple story buildings on which the death column in the accident record is blank. We have both large and small contractors, and I am convinced through my knowledge of accident occurrence in the construction industry that accident prevention is exactly as important, no more and no less, to the small as well as to the large contractor, and that the methods of controlling and minimizing accidents are as much available to the one as to the other.

We have had a small measure of success in preventing accidents. But it is a matter of common discussion in our committee that our work has only nicely begun and that "every day in every way" we expect to become better and better.

PRACTICAL ACCIDENT PREVENTION WORK AS CARRIED ON BY POST AND McCORD

B. W. DELANEY, CLAIM AGENT, POST AND McCORD INC., NEW YORK CITY

The only practical way, known to Post and McCord, to prevent accidents in the construction field is as old as antiquity and at the same time seems to hold good against any other form of safety as yet introduced. It is embodied in two divisions:

The exercise of eternal vigilance, or personal surveillance; and the use of the best equipment procurable.

It has been the experience of Post and McCord during the past ten years, in which the firm has carried its own insurance, that over ninety-five per cent of the accidents occurring among employees working on the many steel structures erected during that period have been due to the carelessness of the injured or to that of his fellow workmen. This in itself emphasizes the necessity of constant watchfulness on the part of both employee and employer, and is supplemented by the fact that many of the most serious accidents which occurred during the period mentioned were due to the momentary carelessness of expert workers; men who had had years of experience in their trade and who were well known as the most careful and competent in their particular line. Hence it is considered necessary to keep in constant and intimate touch with the men in the field.

This program is personally conducted by the Vice-President, Mr. Frank B. McCord, and by the Superintendent of Erection, Mr. William H. McCord, through direct contact with superintendents, foremen, sub-foremen, time-keepers, gang bosses, etc., on the various jobs. Every job is visited daily by either of the above men who carefully inspect and analyze, with the superintendent and his assistants, each operation and problem involved in the progress of the work, and so become acquainted with all the men and all conditions. Suggestions and criticisms are invited; infractions of rules detected; penalties inflicted; dangerous practices eliminated; and, in a word, the whole organization kept on its toes both for efficiency in production and prevention of accident. This, the firm believes, makes every man a separate unit of safety. Of course, this system of supervision is supplemented by various efforts to get the men to think safety, but when it comes to influencing the human element the principal dependency is on the verbal contact established between employer and employee in the way above mentioned.

PROVIDE BEST EQUIPMENT

In the matter of equipment, it has always been the endeavor of Post and McCord to provide the best and most modern machinery and tools obtainable for construction work. In fact, I think it may be said without

fear of contradiction that the erection plant of Post and McCord is the most complete outfit of its kind in the territory of New York City. This does not merely mean that the plant is large and capable of handling big work, but rather that every tool and piece of machinery, from the drift pin to the fifty-ton derrick, was selected with the predominating thought of Safety First.

I believe it is also a matter of history that Post and McCord were the first contractors in New York City to use steam hoisting engines and compressors in the erection of steelwork, and were likewise the first to abandon steam when electricity had been proved a more desirable power for hoisting and air compression. The substitution of steel for wooden derricks was another forward step in which the firm was a pioneer. As a safety factor, however, I think the company's greatest achievement was through the introduction of wire rope slings for hoisting. For many years prior to 1912 the most serious accidents encountered were caused by the breaking of chains used in hoisting. Despite the closest inspection and most rigid care a chain would frequently break with disastrous results. Therefore, a substitute for chains was often the subject of grave discussion among various engineers and members of the firm. Through these discussions the matter was finally brought to the attention of the John A. Roebling's Sons Company, the firm which, after exhaustive experimental work, developed the present day wire rope sling and enabled Post and McCord to be the first in New York to use this valuable factor of safety.

In this respect the firm makes no claim to altruistic motives, simply considering a wide margin of safety the best of insurance protection, a plain duty to the public in general and especially to the employees who have to entrust their lives to the proper performance of the equipment furnished.

Merely purchasing good equipment and putting it on the job does not mean efficiency or accident prevention. The first cost of the average tool or machine used for structural steel erection work is soon lost sight of in the items of upkeep and repairs. Therefore, eternal vigilance is almost as necessary in the inspection and care of the equipment as it is among the men.

At the storeroom of the company in Brooklyn a complete repair department is maintained. This outfit is in charge of men expert in repairing and overhauling the special machinery, tools and drigging used in erection work. These men are held responsible for the condition of all equipment sent to the various jobs and are therefore careful to have everything in good and safe working order before sending it out.

CO-OPERATION NEEDED FOR EDUCATION OF EMPLOYEES

As intimated in a previous paragraph, the firm has never actively pursued a scientifically organized program of safety work among the ironworkers. This is largely due to the fact that in the erection field the average job lasts less than six months or a year, and employees are constantly changing from one employer to another. Consequently, about

the time one would have a safety movement ready to function the job would be finished, and on the next job he would have to start all over again with a new group of men. Therefore, it is the opinion of the firm that in order to make the theoretical feature of "safety-first" a success among the rank and file of the men, movement would have to be made through a general headquarters composed of all employers within a certain district, and also through the headquarters of the various unions and organizations of the employees. In this way the message coming from an authoritative source, would reach all trades and cover all conditions involved.

Would not this work of "organizing the organizers" be a task well worth the attention of such a master Safety Force as the National Safety Council? I have read with marked attention of the wonderful success you have had in establishing the safety movement in various industries throughout the country, and hope that your Structural Department will in the near future be sufficiently strong to have so thoroughly induced all the building trades, employers and employees, with the spirit of Safety First, so that evidence of a careless accident can only be found in records of the past.

HOW SAFETY FIRST PENALIZES THE CONTRACTOR

J. H. SCHULTS, JAMES STEWART & COMPANY, INC., NEW YORK CITY

When the safety movement was first organized, I don't imagine that many of the people interested realized that eventually, to some degree at least, the safety movement would control the contractor rather than the contractor control the safety movement. As the movement progressed various states took it up and adopted safety codes. Following this the different industries adopted their individual codes and we have now reached the point where we are adopting our own code. The result has been that the insurance companies, being of course, vitally interested, put into operation an organization to operate in a number of states, which are known as the "Bureau States," keeping statistics on accident rates of their clients. The tabulation of this record, which is known as experience rating, has resulted in either a credit or premium on the manual rates as applied to each employer based upon this record. As an illustration of this experience rating, our record in the Bureau States has been as follows: in 1921 we received a credit of 36% from the manual rates, in 1922 it was 53% and in 1923 64%. Reducing this to a dollar and cents basis—in the Bureau States, where we have considerable work going on, on each \$100,000 of payroll, using an average manual rate of \$4 per \$100, the premium would be \$4,000 and then applying our credit rating at 64% shows we have an actual saving due to our safety work of \$2,800 on each \$100,000 of payroll.

This illustrates in a most complete and comprehensive manner wherein safety work makes its force felt. Take on the other hand the organization, let us say, that has not adopted safety work in connection with its operations. Its manual rate would reflect the attitude, no doubt, and

would be higher than that enjoyed by our company. The moral is obvious. I think you will agree with me that a penalty is attached to the contractor who does not feel it is necessary to conduct safety work on his operations. It therefore follows that the contractor of today, merely speaking from the dollars and cents viewpoint, cannot afford to disregard safety work and a slackening of his efforts in that direction will certainly show itself in the barometer of the experience rating.

To repeat what has been stated previously by many speakers and printed in the *National Safety News*, it is not necessary that an expert organization be employed to bring about results. So far as our company is concerned we do not find it necessary and the same methods can be followed by the smaller company just as well. The work is carried on at the direction of the head office through the superintendent and foremen on each job, the operation of safety committees, etc., nothing unusual nor hard to duplicate, but merely the will to start and keep at it. The *Safety News* keeps one in touch with conditions, selecting your bulletins to match your operations keeps the job from forgetting, and your accident reports tells you what you are accomplishing.

This shows that safety pays dividends as evidenced by the experience credit rating our company has earned through pushing safety first and through this credit rating the incentive is provided for pushing the work to make a better record. Of course, it is needless to say that the experience credit rating shows to our officials that following up safety on our work is a paying proposition and long past the experimental stage.

Mr. MacMullan has referred to the humanitarian standpoint. The humanitarian viewpoint primarily, I believe, had a great deal to do with inaugurating the Safety First movement but it seems to me it has now reached the point where you can almost say it is looked at strictly from a money saving view rather than from the humanitarian standpoint; but humanitarianism naturally follows the Safety movement, just as sure as night follows day. You cannot do safety work without doing humanitarian work, and you cannot do humanitarian work without bringing in safety work, but whichever you do, or whatever you call it, in the long run the result is the same and the reward generous. If you do not practice Safety, then to my mind it is the same as omitting an item in your estimate when figuring on a job and to that extent you have penalized yourself.

REPORT OF MEMBERSHIP COMMITTEE

Mr. Woedtke: The number of members in the Section at the present time is 79. Twelve members cancelled their membership during the past year; they were mostly ship yard people who went out of business or who no longer have much occasion for belonging to this Section. The number of new members secured since October 1, 1922 is 12. That makes the membership as of date 79 firms.

I want to say a word or two about this membership question. We come here year after year. We get the benefit of what is presented here and of course we get it from one another. We go away from these meet-

ings and forget all about the Section and naturally there is very little done on the question of increased membership, except by the Committee. The Committee has certainly put in a lot of time. We got up a mailing list of all the contractors from all over the country, at quite a bit of time and expense, and we circularized them with I think a series of five or six letters. We have been able to hold our own and we got 12 new ones in for the 12 we lost.

Chairman Davidson: When the Membership Committee come to any of you during this next year for assistance, and ask you possibly for the address of a contractor or two contractors, or five contractors that you personally know or have contact with, who are not members, we want you to co-operate with us by giving us those names and possibly writing them a letter over your own signature telling them of the work we are trying to do, that it is good work, and ask them to "come on in, the water is fine."

REPORT OF NOMINATING COMMITTEE

Mr. Dick: Mr. Chairman, the Nominating Committee reports the following names as suggestions for officers for the ensuing year:

Chairman, Mr. J. H. Schults, Jas. Stewart & Co., New York.

Vice-Chairman, Mr. W. F. Ames, McClintic-Marshall Co., Pittsburgh.

Secretary, Mr. C. H. Almstead, Dwight P. Robinson Co., New York.

(The nominees were thereupon duly elected.)

Mr. Woedtke: I, for one, appreciate very, very much what the retiring Chairman and his board of officers have done to carry on the work of this Section.

It was no sweet job in the beginning to form this section; it was quite a battle to keep it going. When I was chairman, the retiring chairman was one of the best bets I had to back me up all the way through. He never kicked; he never squealed or laid down on any job, large or small.

He went through and headed up and accomplished for this section one of the greatest things that it has done, or any other section has done, in completing the standard statistical methods which this section has been using for the past year.

At this time when Mr. Davidson is retiring I move you, Mr. Secretary, that we extend to him a rising vote of thanks for his hard work, and all that he has done to keep this Section going and progressing.

The motion was seconded and carried.

Mr. Hurlbutt assumed the Chair.

FURTHER DISCUSSION OF CODE

Mr. Dick: In reading Section 33 again, it seems to me a little bit incomplete in that you mention guyed derricks only and nothing about stiff-legs and speak of goosenecks in connection with guyed derricks. I think that ought to be revised to bring out clearer that there are two kinds of derricks intended.

Chairman Hurlbutt: Had you any specific point to bring out in connection with stiff-leg derricks?

Mr. Dick: No, merely the point that they should be mentioned as different from the guyed derricks. Also put in breast derricks.

We are going just a little out of line in Paragraph 340. You say no cable shall be used in which more than 10 per cent of the wires are broken in any one foot of the cable. I don't know that you can definitely specify what is going to condemn a cable, but it seems to me that is hardly enough.

Mr. McKinley: Well, when you say 10 per cent of the wires, I should think it would mean 10 per cent of the wires in any one strand because you may have 5 or 6 strands, and the cable would be pretty well shot with 10 per cent of the entire number of wires of the 5 or 6 strands broken. We figure in elevator cables about 10 per cent of the wires in any one strand, not the entire cable.

Chairman Hurlbutt: You mustn't confuse this with elevator practice because elevator practice requires and demands a much greater factor of safety than we require on load lifting with derricks and blocks. To begin with, your cables are run at a much higher speed.

Mr. McKinley: That is true, but if 10 per cent of the wires in a 5-strand cable were broken, why your cable would be gone. That is all there is to it. There won't be anything left if you wait that long.

Chairman Hurlbutt: There seems to be considerable dispute on this point, Mr. Secretary. Will you make a note for the Committee to go into this matter further?

Section 35 on Signals—this is a very difficult thing to put in a code for the simple reason that there is a conflict in the practice used over the country.

Mr. Williams: This is the most puzzling thing I have found in this whole Code, and it seems to be quite important because we have conflicting codes of hoisting signals, there is a possibility of a lot of trouble.

There are two possible codes of signals which are in general use, having reference to the principal operations of hoisting, lowering and stopping.

DERRICK CODE

The common derrick code is one bell to raise, one bell to stop, and two bells to lower. That, as far as I have observed, is in universal use on derricks and in many places the same code is used for a platform hoist—one to raise, one to stop, and two to lower. Safety men will see immediately the possibility of confusion there, if you have one bell to raise and one bell to stop. There is a second possibility of confusion and accident in that any "one" signal may be given accidentally. If it is a case of pulling a wire or a cord, the cord may be pulled accidentally by something snagging it and breaking it; and just the instant before it breaks, it gives the "one" signal.

The president of the hoisting engineers' union himself related, from his own experience, an incident to me where the signal was given by an electric push button. Part of the case of the push button was broken and the spring was exposed; it was lying on a wall or plank somewhere on the building and somebody accidentally sat on it, or put his hand on it, or laid something on it, which made the contact and gave a "one" signal.

That possibility of giving a "one" signal is always present in any sort of signaling apparatus and therefore the safe practice is obviously that a one signal should mean to stop because there is very little likelihood of hurting anybody by stopping. For example, on street cars they use one bell to stop and two bells to go. Therefore, when you have a code of one to raise and one to stop, there is greater possibility of accidents occurring.

The New York State Code says one to raise, one to stop and two to lower for platform elevators as well as for derricks, and we put that into the initial draft of this Code. The first objection we met was from Mr. Rosedale, who is with the Industrial Commission of California. He pointed out some of these hazards that I have just been describing to you and said that in California they use the other code, what I referred to as a 1, 2, 3 code, that is, 1 to stop, 2 to raise, and 3 to lower—three separate signals for those three operations.

Then when I looked into it a little farther, I found that that 1, 2, 3 code was in effect in New York City, and I think in fact that it has been adopted and enforced by the Hoisting Engineers' Union in New York City, despite the fact that the New York State Code is different. In other words, you have one condition in New York State and another condition in New York City. And one of the members of our Committee who is in the Travelers' Insurance Company showed me a card that they distributed widely in New York City which has the 1, 2, 3 code. I understand that that is standard in New York City.

So you see what a mixed-up situation we have. We have one code for derricks and that same code officially adopted by New York State for platform elevators contains at least the elements of serious danger. And we have another code, which seems a good deal safer, in New York City for platform hoists but not for derricks, and which of course has the disadvantage of being slightly slower. It takes a little longer to ring 3 bells than to ring 2 bells, and if you are absolutely a hound for output—which of course you must be—I can see where the superintendent or foreman of a steel erection gang or any other superintendent or foreman might object to changing his system by adopting a code which would substitute 3 for 2, because it is true if he adopts that code it will be slightly slower.

It does seem to me as if we ought to look for some sort of standardization. At least, we ought to put in this Code what seems to us the best standard, not expecting of course that everybody will be wide-awake

enough to adopt that standard but hoping that any state that hasn't any standard now will adopt this one and that gradually we will arrive at something approaching uniformity.

Mr. Dick: I believe it is a wise thing to consider this entirely from the side of safety and not from the side of what is common practice today. We are suggesting something that we think is going to minimize danger, and uniformity is certainly the thing to have. I don't see why there should be different signals for derricks and hoists. The 1, 2, 3, code to me is the most logical thing to have.

I would suggest that we convey to Mr. Williams that that is the feeling of this meeting.

Chairman Hurlbutt: You express the general sentiment of the Committee, too, Mr. Dick.

Mr. Charles A. Buck (Bryant & Detwiter Co., Detroit): I think there ought to be standardization on the matter of bells, because whistles cause confusion, especially when you are on an industrial job. Whistles are used in every community for quitting or starting work.

Mr. Dick: I agree on that. Signal lights ought never to be used on any construction job, nor whistles.

DIGGING AND TRENCH WORK

Mr. Paris: Section 41, Ditching and Trench Work. I should think it would be well to say we are not in conflict with any local regulation, law or ordinance, or something of that sort, which would call attention to those local regulations.

Mr. Dick: In connection with Section 41 I would eliminate the mandatory provision as to sizes of lumber.

Chairman Hurlbutt: If you will note, those are minimum sizes. Certainly you as a construction man wouldn't advocate anything less than that.

Mr. Dick: No, not at all. The idea is there are so many cases in which the particular ditch or trench doesn't fall right within the limits of the description.

Chairman Hurlbutt: All right, I will make this suggestion, if it meets with your approval: that we stiffen that paragraph by saying, "The above sizes are given as minimums and local conditions may require larger sectional timbers."

Mr. Woedtke: Mr. Chairman, it says in Section 54, "On every job where more than 250 men are employed a first-aid room, dispensary, or field hospital shall be provided, with a physician or competent nurse in attendance."

There are any number of jobs with more than 250 men on them where 70 per cent of them are sub-contractors' men, and it isn't practical to have a dispensary or a field hospital, but you do leave in the air the first-aid room. What do you mean by a first-aid room—one set aside strictly for that purpose?

Chairman Hurlbutt: A small room in your field office or a small building, if it is a large enough job.

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In my own case, on the jobs where we had that many men employed, there was generally an opportunity of partitioning off a small part of the field office quite near the employment room, and we put in there first-aid equipment: a cot and the things necessary to take care of an injury until an ambulance could be brought from the city. If the job wasn't large enough to justify an ambulance of our own. We had on jobs of that type—the smaller jobs—a part-time safety man who was also a first-aid man. On the larger jobs of course that was taken care of with a regular physician. But this man was in attendance at the employment office and was available to serve in the capacity of first-aid man when he was needed in that capacity.

That is a very small room and doesn't require much equipment. When you get to the larger job, you are justified in having a real small hospital room.

Mr. Schults: Mr. Chairman, on that point, where the work is being done in a city of any size and the work is covered by an insurance company, they don't want you to tinker with it at all, that is, if it goes beyond the point where it is an ordinary scratch or something of that kind. They want you to send the man to the doctor.

Chairman Hurlbutt: Right up here in the city of Buffalo, the DuPont people put up a plant on the road just over the city line. The nearest hospital was about six miles away. That meant if a man was injured, had a ruptured vein, or artery, or something like that, they would be seriously handicapped. Well, what could they do? They had to put in some means of taking care of that man until they could get an ambulance to run out from the city, if the man was in such shape that he couldn't be put in an ordinary car. You can't put a stretcher in an ordinary car.

Mr. Woedtke: Mr. Chairman, I submit again that the clause is too brief. If you are calling for a stretcher, call for a stretcher as part of your first-aid outfit. We have a stretcher on every big job and we have a first-aid cabinet on every job, large or small.

FIRST AID ROOMS

Chairman Hurlbutt: You make the recommendation then that we amplify and specify what we ought to have here for first-aid rooms, is that it?

Mr. Woedtke: Either that, or else change the word "shall" to "should." I could mention a lot of cases where it would be unnecessary—where we have a doctor within two to five blocks that we can get to any time, and where we have a hospital within a short distance. And believe me, I don't want any of my injured men on a job being fussed over any more than absolutely necessary by laymen.

It is all very well to have a standard. I have a standard list of contents for a first-aid cabinet and there is a penalty of discharge imposed on any one if they change that list. Yet those fish will put in peroxide

and all sorts of junk that their grandmother used to use to cure pains and aches of all kinds. It is a bad thing to have laymen monkeying with these injuries any more than absolutely necessary.

Chairman Hurlbutt: If you will read the thing as written it says "shall be provided with a physician or competent nurse"—it isn't case of a layman fooling with it when you get to a job of that size. Do you want to do this: would you suggest that we qualify that by saying unless the job is located within such proximity of a hospital and a physician that he can be obtained at any time, it will be necessary to provide these things?

Mr. Woedtke: That is all right.

Mr. Schults: That would cover the point I had in mind also.

Mr. Woedtke: Otherwise, I want the word "shall" changed to "should."

Mr. Paris: Before we pass that point, I want to ask a question on the case that Mr. Woedtke suggested—where there are 250 men employed on the job, 50 of whom at a given time are employees of a general contractor, and the other 200, or any other number, are employees of sub-contractors. Whose duty, according to that Code, is it in such a case to provide this dispensary?

Mr. Woedtke: I suggest that the Committee consider wording it in proper phraseology to make it clear that this Code does not place the responsibility wholly upon the general contractor.

Mr. Paris: That is my mind on the matter.

Mr. Dick: Do you mean paragraph 604 to take care of the usual handling or passing of lumber from one floor to another?

Chairman Hurlbutt I would say that it does not cover hand passing.

Mr. Dick: That is usually done over a sidewalk bridge, anyway.

Mr. Harding: Would that apply to a lumber skip?

Chairman Hurlbutt: We will make a note to consider in Committee whether or not 604 applies to lumber skip hoists.

I will ask if there are any gentlemen in attendance who have points which have not been covered today, or which were covered yesterday in their absence on which they would like to make a criticism or offer a suggestion, that they send those to Mr. Sidney Williams at the National Safety Council office. I will turn the meeting over to Mr. Davidson.

Mr. Paris: Mr. Chairman, before adjourning, I would like to say one word that I think will interest all of us. It is in line with a discussion that we had last night on the subject of the future of this section.

I think that many of us perhaps allow ourselves to forget that this is not a corporation with a service that it produces and sells for a price, but that it is an association of all of us, which is organized for the purpose of exchanging ideas that will be of benefit to one another. We

have only 79 members. If we had 790 members we would have a good many more suggestions and helpful hints and ideas to exchange and therefore the scope and benefit of this Section would be very much enlarged. Its efficiency would be raised.

I think every one that is here now can go away and within the next twelve months bring in a new member. I honestly believe every one of us can do that. I think every one of us ought to go away from here accepting the responsibility to increase the Section to 150 members, at least, by a year from now.

Mr. Woedtke: I am going to try to get one member, Mr. Chairman. I think that is a mighty good thought.

Chairman Davidson: These suggestions have been put up to you. Come through and back up the new Chairman.

ADJOURNMENT

EDUCATION SECTION

October 2, 1923

DR. E. GEORGE PAYNE, Chairman

Professor of Educational Sociology, New York University, New York City

DR. JOHN J. TIGERT, Vice-Chairman

United States Commissioner of Education, Washington, D. C.

A. W. WHITNEY, Secretary

Associate General Manager, National Bureau of Casualty & Surety
Underwriters, New York City

MISS MARY N. ARROWSMITH, Assistant Secretary

CHAIRMAN PAYNE: This is the sixth Annual Congress of the National Safety Council in which I have had an active part in educational work. Commencing five years ago the programme of education has been developing. I remember in the beginning of that programme, as I said in an address this morning, that whenever we spoke of dealing with education of accident prevention as a school matter, educators were inclined to smile and say that was not a function of education. It is a function of the police; it is a function of the civil authorities; it is a function of industry. It is the purpose of everybody to deal with safety education except the educator.

REPORT OF SECRETARY

ALBERT W. WHITNEY

The work has been first in getting in touch with the schools of the country. First, a questionnaire was sent out to all the school superintendents in cities of over 10,000, I believe, was the limit. If I remember rightly, 700 or 1,000 such cities. We got into actual correspondence with those superintendents to find out just exactly what was being done.

Then, the actual organization work came down to this: to selecting certain cities and certain schools in which to hold demonstrations. For instance, the work that was done most successfully and most thoroughly was done in Massachusetts, where I believe about five cities were picked out. Particular schools in those cities agreed to hold demonstrations. The state was districted and all the schools in those various regions were notified of the date of this demonstration, and to a very large

extent they sent representatives to see the work that was being carried on in these schools. The work lasted for one or two days and was very successful; unusually good work was done and the schools got up a great deal of enthusiasm over it. They were not told how to do it. They were just told in general what to do and each school worked out the problem in its own way.

That is, the demonstration work has been the particular feature of the year's work. The preparation for this involved, of course, a great deal of correspondence and actual visiting of schools on the spot, and I want to say that Dr. Payne has visited a large number of schools and made speeches in getting this work actually started. Now the work is actually started, and I don't think it will be very difficult to carry this same system out to a very considerable extent all over the United States, so that we can have these demonstrations; and pretty soon we ought to have a knowledge of how safety education can be carried on in the schools all over the country.

Just a word now about the future. As I visualize it, the important thing that we can do in the immediate future—and that has been done to a very considerable extent—is to make safety attractive. Our teaching at first was not so. It was very largely negative—"Don't do this children," and holding up the horrors of accidents and all that. It was not an attractive thing. But if you will just go into the educational exhibit upstairs—none of you should leave the building until you do that—you will see that this year the teaching of safety is not an unattractive thing. It is a very charming thing. We have found it possible to bring it before children in a very charming way so that it has become a beautiful thing.

MUST CONVINCE PARENTS AND TEACHERS

I think the change is just the same as the change in teaching itself. Forty years ago school was a prison and children wanted to escape from school. Now the difficulty is to keep them away. The children want to go to school. The whole attitude is changed. Very much that same thing has happened in educational work.

The idea of the play, "Adventure," is to get safety education into the schools. In order to get into the schools we must convince the teachers and the parents. If we stop and try to convince teachers and parents through their intelligences alone it will be a very long job. And so we thought the way to get to them was to get in through the other door in their minds—through their emotions. Child safety is a highly emotional thing. We don't stop to think about the safety of our children. We feel about it. But if we are going to carry this on on the emotional basis we necessarily had to do it on a dramatic basis to get it over in any large way.

And so we got one of the best playwrights in the country—Thomas Wood Stevens, head of the Department of Drama of Carnegie Institute of Technology, in Pittsburgh—to write us a play, and his department

with a cast of 61 is giving it here now. We don't claim this is the last word, but all that we would like to demonstrate is that it is *possible* to dramatize safety.

If we are successful in dramatizing safety, it means we have got an opening them to all the parents all over the country, and there is no reason then why this whole thing should not spread and get a real strong emotional impetus back of it.

APPOINTMENT OF NOMINATING COMMITTEE

Chairman Payne: I have been requested to announce the programme of the Thursday afternoon session of the Women's Division, to be given in the Fillmore Room on the Mezzanine floor of the Statler Hotel. This relates to mothers' interest in accident prevention, teaching the child to be careful, and other subjects of that kind along the lines of education this afternoon. It is requested that the children and teachers send word to the parents of the community in order that those who are interested may attend the session.

At this time it is also necessary to name the Nominating Committee for the officers of this Section for the ensuing year. I should like to name on that Committee:

Mr. MacBrayne, of Massachusetts, Chairman.

Mr. Remmers, of St. Louis.

Mr. Lewis, of Baltimore.

Since we have only one session it is necessary that the nominations be made this afternoon and the election take place at the close of the session.

We are very fortunate this afternoon in having under the direction of the Safety Committee, a committee of school people of Buffalo, a demonstration of the work of safety education along the line we have outlined, and along the line for which the Education Committee is standing.

Buffalo has done an excellent piece of safety education work and you can have the opportunity this afternoon of seeing something of that. We have provided short addresses in which the different types of work will be explained followed by a demonstration of the work of the children.

THE REQUISITES OF SAFETY INSTRUCTION IN ELEMENTARY SCHOOLS

GEORGE B. MASSLICH, SUPERINTENDENT, CHICAGO AND COOK COUNTY SCHOOL
FOR BOYS, CHICAGO, ILL.

When we talk about the requirements for a safety course in education in the public schools we have to consider what we mean by learning, how learning goes on. Experience, personal experience, is the old orthodox, dyed-in-the-wool way to learn anything; but experience is a dear teacher and we can't use experience for all of that.

Applied to safety, perhaps, we might say that the burned child dreads the fire as a safety experience. The child dreads the fire because he has

had the painful experience. We don't want all of our children to be burned before they know that fire is to be dreaded. Although I did see some time ago in a magazine the suggestion made seriously that if a child did play with matches against the parents' wish, that it was allowable for the parents to light a match and burn the child's fingers a little bit so that he would know from the pain that it wasn't a good thing. I don't believe we would want to go that far.

Primitive man had only his own muscles, the muscles of his arms and legs and body, to have experience with, added to sticks and stones and such rude tools as he could make out. And from a toddling child he grew up experiencing the world around him gradually, so that he met every safety situation that he needed to meet as it came, and in a sense he did learn by experience.

But today it is far different from that. How many of us would have thought a generation ago that we should see boys and girls like these down in front of me, some of the older ones, sitting at the wheels of automobiles that had the power of 25 or 50 horses and the ability to go with the speed of a train down our streets—not on rails but here and there where they would. That great use of power by immature children was a thing we never dreamt of a few years ago. Nor did we think that the innocent-looking electric wire had in it the light of the sun or the heat of the blaze in your furnace, or the destructive powers of the thunderbolt. We have gotten power, all of us, without the ability to use that power.

WARNING AND SHOCK AS SAFETY METHODS

Now we have realized that to a certain extent, and there have been two methods that everyone has used to try to make for safety among children. One is the warning, and the other is the attempt to show the horrors of an accident and shock children into being careful.

Warnings are not of very much avail because the child is naturally optimistic and he doesn't think anything is going to happen to him. He is just exactly like the boy who went fishing and fell in and then was fished out by some man who passed by and the man said: "Sonny, how did you come to fall in?" He said: "I didn't come to fall in. I came to fish." He hadn't any notion he was going to meet with an accident, and the child doesn't heed your warnings because he doesn't think it means him at all. He is not going to have any trouble. He is going right along. As far as shocking the child is concerned, that also has not as great effect as we think.

Some time ago I showed a safety motion picture film to a group of little children of foreign parentage, and when the automobile disregarding safety signals went through the open drawbridge into the river the children laughed. And when the driver of the delivery truck tried to beat the train at a crossing and the delivery truck was apparently smashed into kindling wood, the children applauded and cheered. To them it was almost as good as the thriller which they had seen at the paid movie a little before.

Those two methods are not going to go to any great extent. We have got somehow to do what we have done in thrift education, in moral and humane education, in patriotism, in all of those endeavors. And we lived through that with those things pretty much, and we have got to live through that with safety, or else we have got to learn the lessons that we learned from those.

I used to talk myself hoarse about thrift to children until ten years ago I started a savings bank in the school I was then principal of, with the promise that any child could deposit a cent or any amount more than that any day of the week, and could get the penny out or all of the money he put in, out when he wanted it out. Pretty soon we had 600 depositors in the school of 1,300, and they very soon got as much as \$1,200 together which they used to buy Christmas presents with for their parents and for other good usage. In other words, as soon as the child did something on thrift, he learned what thrift was.

We do the same thing with patriotism. Our patriotism amounted to nothing until the emergency of the World War, when there was something to do patriotic for the country. Then we learned patriotism.

I was brought up on the old fashioned McGuffey's reader that taught that it was wicked to rob a bird's nest, but I doubt if that warning ever did very much to the robbers of birds' nests. Now we teach that if the boy will leave the bird's eggs alone in the nest that something far more interesting is going to happen to those eggs than would happen if he played with them until he broke them; namely, that the little birds are going to peck at the shell and get out pretty soon and open their mouths in that wide, funny way for the mother to drop worms in. That is a lot more interesting than breaking birds' eggs, and that is going to do something for us.

CHILD MUST LEARN TO THINK SAFETY

If we can do the same thing with safety, I think we are saved with reference to the children. There must be a kind of flavor of safety through all of the school work, just as there is a flavor of honesty, of good manners, a flavor of doing the right thing, the loyal, patriotic thing, a reverence to old people, to parents and so on. That need not be confined to the English work. Of course, it is evident how that can be and we can write essays on safety and we can give safety plays, and we can do things of that sort; but there can be in every endeavor in school some reference to safety, so that after a while the child gets dyed with that, and when he goes out of school he thinks of safety not in a gloomy, mournful way, but he just thinks of it—just as he thinks of supper about supper time.

If there is a geography project and you are discussing the cost of coal, count along with that the cost of the hazardous occupation of mining, and learn that coal is not only something that is made from the dead fragments of vegetable matter or possibly of fishes, as the

lake scientist has said; but that coal represents dead bodies of miners that have been killed in coal mines, and that is part of the expense, the danger, that comes to those men.

If we are studying some food product that comes from some far off country of the world, we can study the trip which that product has to make across the seas to us, and the hazards of the ships and of the men on the ships and so on.

I am not going to take further time for that except to remind those of you who have had safety patrols, that these children in front who have been ushered across the streets by a safety patrol boy, will think of the safety patrol boy on Saturday and Sunday when he isn't there, and in that way, as someone remarked in the Public Safety Section meeting a few minutes ago, the little children who go to school now, will grow up to have a better sense of safety.

I, as a teacher of twenty-five years' experience, am very jealous of the teaching profession. I don't want somebody outside to come in and assume that teaching can be learned in five minutes. I want the teaching done by teachers. But we do need the help of all of the outside organizations. Let the child, if he will, write a letter to the public official, alderman or other, who is responsible for some bad public safety condition; and the child will watch until he gets an answer from that public official and after that he will watch until the error is corrected. We must not use only the child's activities, but we must enlist the whole community.

It was hard to secure a hearing for safety under that title, and you would have to disguise what you were going to say under some such subject as reconstruction of the curriculum or conservation of human life, or some other subject, so that educators would not know that you were going to discuss the subject of accident prevention as a school problem.

The remarkable change that has taken place since that time is one of the most encouraging things in American education to my mind; and that I have had an opportunity of witnessing during the past year. One of the marked achievements is the fact that a university that has between twenty and twenty-five thousand students has introduced into its curriculum for the training of teachers a course in education and accident prevention, and while the five hundred students who are taking work with me will not all be in that course, probably half of them will be taking that work, and others will have methods of safety this year as an educational matter.

TEACHERS ENDORSE SAFETY COURSES

Aside from that, at a meeting of 700 principals and superintendents in the Schoolmasters' Club of New York City during the past year, at the close of a presentation of this matter, those 700 superintendents and principals, who represent one in every 10 of the school children of the United States coming from the New York industrial area, arose and pledged themselves to undertake as a school proposition safety

education. As Mr. Kilpatrick said not only to his classes but to the students in announcing the address that was to be given there on this subject—that one of the greatest contributions of the 20th Century to education is the contribution of education of accident prevention as fundamental in the school curriculum.

That is, it seems to me, a remarkable advance. It seems to me we have come to this point in the development of education, and I think that will be brought out in the programme here this afternoon in the demonstration that is to be given, that we have passed over the period of propaganda, that we no longer need to defend or promote education in accident prevention because it has been sold, if you use the commercial term, to the educators of the country, and it has found an important place in the curricula of those institutions.

Therefore, our problem it seems to me, henceforth is that of providing assistance for those who are actually in the work and those who are undertaking education in accident prevention. This is confirmed further by reports from those cities in which demonstrations were given during the past year, which I cannot read here, in which the superintendent said that these demonstrations of this work, carried out as a fundamental part of the curriculum, had added new life to the regular subjects of the curriculum, such as arithmetic, geography and history, and has given them a new vision of education, a new conception of the whole problem of education, had been brought about through the enlivening of the subject matter with this kind of material. So, as I say, it seems to me our problem henceforth is to render assistance to those who are calling for it by the hundreds in their effort to work out an adequate programme of accident prevention.

At this point I want to present to you the Secretary of our Section, who will make a report for the Committee of the work that has been carried on during the year. I am glad to present Mr. A. W. Whitney, of the Bureau of Casualty and Surety Underwriters of New York City.

HOW BUFFALO TEACHES SAFETY IN ITS PUBLIC SCHOOLS

ELMER J. COBB, PRINCIPAL, SCHOOL 60; CHAIRMAN OF THE SCHOOL
COMMITTEE OF THE SAFETY BUREAU, BUFFALO, N. Y.

Thus far in Buffalo the safety work in the public schools has been carried on by a committee of principals and supervisors in conjunction with the Safety Bureau of the Chamber of Commerce. This work has been of a voluntary nature, done for the protection of the school children of our city. Like all the safety work in the larger cities of the United States it has been experimental and provisional, and thus far in Buffalo has been carried without any financial support from the Department of Education.

Our School Safety Committee has held many meetings with the manager of the Safety Bureau of the Chamber of Commerce, Mr. Sidney Coleman, where we have discussed and studied the work done in other cities and have planned the work of introducing safety teaching in the public

schools of our city as rapidly as we could gain the support and cooperation of the schools themselves. We received valuable help and suggestions from Dr. Payne and from Mr. Cameron and Miss Arrowsmith of the National Safety Council, and as the result of our work we have decided that our greatest service to safety in Buffalo can be done by placing in every teacher's desk in the city of Buffalo each month a loose leaf safety suggestion; and these for October have been sent to every school, including the parochial schools, in which one subject is taken for each grade or in each group of schools. For instance, we have lessons for the first three years, intermediate lessons for the next three, and more advanced lessons for the upper grades.

We expect to supplement this work by helpful suggestions in the school magazine which goes to every teacher each month, and by other loose leaf suggestions sent directly to the teachers. These lessons will be printed on paper of uniform size to correspond with suggestions of our physical department that are sent to teachers each month and will be distributed by them. Our physical education directors have agreed to assist the teachers in the safety games we suggest and in other ways to help them make this programme a success.

Besides these loose leaf suggestions to the teachers, our committee has arranged a system of safety patrols in schools having a dangerous traffic condition, and many of the schools have already taken up this safety patrol work. A part of our programme today will illustrate how these safety patrols work, how the work is carried on in Dr. Connor's school, Public School No. 6.

Last year several schools undertook safety propaganda and in doing this a number of safety playlets were written to arrange in helping this work. The one we are to present this afternoon was written and arranged by Miss Meeker and Miss Hood of the Riverside School No. 60 for third grade children, and Mr. Cameron and Mr. Coleman thought it would be an interesting thing to present to our teachers and visitors to the city at that time, and I shall be very glad to have these teachers give you this little playlet, which is shown by the third grade children.

"Safety Land," a play by third grade children of School 60 was given.

BUSINESS MEETINGS OF THE SCHOOL SAFETY PATROL

DR. T. W. CONNORS, PRINCIPAL, SCHOOL 6, BUFFALO, N. Y.

I want first to express my appreciation for the very valuable assistance given us by Miss Arrowsmith, Mr. Cameron, and Mr. Coleman in starting the safety work in Number Six School. Whatever merit there is in our work I feel is entirely due to them. They have given us many valuable suggestions. They have supplied us with literature and posters promoting safety ideas. The National Safety Council is to be congratulated on having such intelligent, energetic and inspiring workers. No one could meet with these workers and fail to enter his work with zeal and enthusiasm. In establishing the Safety Patrol at Number Six, we had in mind two things:

1. The selection and training of pupils for the patrol.
2. Developing in all pupils of the school the proper attitude toward the members of the patrol and toward safety ideas in general.

All pupils were thoroughly grounded in what we considered the fundamental principles of safety education, namely, that to be able to take care of one's self, to take reasonable and proper safeguards in avoiding dangerous situations is an indication of intelligence; to do the contrary is a sign of weakness and lack of intelligence. We have Italian children at Number Six. We contrasted the comparative safety of the early environment of the parents with the dangerous element in our city life, the automobile, the trolley car, the electric wire and the railroad yards. We stressed the importance of acquiring habits to avoid these dangers. To be careless is foolhardy, to be cautious is wise.

SELECTION OF PATROL

Our patrol was selected from those children who displayed intelligence and were gifted with qualities of leadership. They were instructed not to be aggressive, bossy or important, but to work quietly, to suggest rather than command. They were told, when they met with violation of safety principles, to assume that the offender was thoughtless and to remind him of his danger and if the offender ignored the suggestion to report the incident to us. We have two patrols, each under the charge of a teacher. The teacher meets the patrol members daily and with inspiring words and helpful suggestions keeps up a fine morale. The patrols are teeming with enthusiasm. Every time I meet a member of the patrol we have an interesting and stimulating talk.

All the resources of the school are used to obtain from the pupils the proper attitude towards the patrols and towards safety ideas. The pupils were especially impressed with the fact that patrol work was not tattling and that the patrols were working for them. They were urged to co-operate with the patrol, to suggest to offenders of safety rules their danger and report persistent offender to the teachers.

As yet we have not made as much as we desire of the business meetings of our patrol. The meetings are more or less informal. We depend upon daily contacts and timely suggestions. We are striving to get all the pupils of the school to see the value and feel the interest in safety, to make them feel the burden rests upon all, not on a few.

We have found that all the subjects of the curriculum lend themselves to safety work. We have also found that safety work helps the spirit of the school and makes discipline easier. A teacher who can modify the reaction of her pupils on the street has little trouble in controlling the responses in the class room.

A business meeting of School Safety Patrol, School 6, was given at this point.

TRAFFIC GAMES IN THE PRIMARY GRADES

REV. JOHN P. BOLAND, BUFFALO, N. Y.

If we review our babyhood and early childhood impressions keeping in mind, of course, the experiences of little folks of today, we find it

easy to conclude that the noise and locomotion are at the bottom of the pleasure derived from most of that period's games. We note, too, that the noise does not have to be rhythmic, nor can the movement be anything but rapid. The ulterior purpose is, possibly, exhilaration. The joy of the Indian war-whoop, the thrill of the loud horn or the circus parade calliope are samples of noise exhilaration. The delight of the rush of air in the swing, whether this be fashioned of rope and a board or of mother's arms, and the sheer happiness of careening along on a pushmobile or skates are the fruits of locomotor exhilaration. When both noise and rapid motion are found together who can measure the height to which high spirits are driven?

I would have you remember that games that entail rapid transit, traveling, riding, are instinctive and adults do not abandon them, upon reaching grownuphood's estate. They merely modify and perfect and pay more for the apparatus. There is a difference, in degree of ability, not of kind, between riding a hobby horse and galloping down leafy pathways on a riding academy steed. Racing a toy automobile at eight and getting 60 miles an hour out of a sport model at 18 or 58, are in the same category as far as satisfying speed appetite is concerned. It is the body's exuberance, and the ingercence of mind is rightly considered an intrusion. Which, by the way, is what the motorcycle cop says when he finally catches up with the speeder.

It is easy for us to marshal all locomotor games, whether childrens' or adults', into that classification which we will call transportation pay.

And traffic games fit into the general group by contrast, and in the manner of a corrective. Traffic games, too, are complex in their construction and foisted, as it were, upon little players for their worth as sources of traffic education.

Traffic games are but a chapter in the book of transportation games. They are based upon these latter, derive their existence from them, entail a close imitation of them. But they are a contrast. Despite their similarity, there is a difference of motive. Traffic games bid children beware of the dangers of speed, their own or that of street and sidewalk traffic, they teach a saving love of calm decision, presence of mind and careful pedestrianism. Their ulterior purpose is the exhilaration of getting about, walking, running or riding, in safety. Thus, they are corrective of the extremes of rapid motion play, speed and forgetfulness of traffic conditions. They are complex, for they contain most of the elements of the parent group of games that are productive of genuine fun. There is mystery, and plenty of it, for crossing a street safely where traffic is heavy, has become an adventure even for adults. There is the element of rivalry, oncoming traffic being the enemy. And there is the keen pleasure of achievement. We have no statistics, but close observation of local conditions—in the school districts where these games are played—show few or no accidents, and unusual care at the curb and in the center of the street before crossing, surely a help to motorists. Children carry the thought of their traffic games from the school room where they are played to the great workaday world outside.

Finally, these games are evolved and, in a manner, foisted upon little children. Baseball, too, is evolved, having been developed out of the game called "one old cat." Basketball was originally foisted upon the youth of the land. These latter met with the full approval of those for whom they were intended. Traffic games, likewise, will flourish or be abandoned, not because educators desire them to succeed or fail, but in so far as they supply a demand and bring satisfaction to those who play them. Certain it is, that they will have an important part in educating young America to follow Safety rules in traffic and industry.

The traffic games for the younger children were given at this point.

The demonstration of the Miniature Theatre, by Miss Stella Boothe, with safety stories and suggestions for safety games which may be used in the class-room or playground were given at this point.

REPORT OF NOMINATING COMMITTEE

Chairman Payne: I will just take one minute to complete the program. I should like to say before calling for the nomination of officers by Mr. MacBrayne that I have myself been facing a very serious problem in the last few days, and that is one problem of continuing in an active way in connection with the educational work of the National Safety Council. After consideration I have come to the conclusion that I cannot give the time to the educational section that is necessary and that I would give if I should continue in active connection with it. I have tried to respond to every call that has been made upon me in the past five years, and during that time have attended six of the Congresses of the National Safety Council. I feel that the great work of propaganda has been largely completed. I shall devote my time to safety work as a university instructor in the preparation of better materials for realizing the safety plan, and, therefore, do not expect to sever my connections wholly with the work; but, as I say, I cannot give the time actually to the promotion work that I have in the past. I want to make that announcement to anticipate anything that might be done by this Committee.

Mr. MacBrayne: The committee very much regretted that Mr. Payne who has served the committee so well is not able to accept a re-nomination.

The committee will, therefore, recommend for Chairman, Mr. A. W. Whitney of New York. Vice-Chairman, Mr. Heszke, of Cincinnati, who is engaged in very important safety instruction in the schools there. And for Secretary, Mr. G. B. Masslich, of Chicago, who is very closely identified with the course of safety instruction.

Member: I move that the secretary be instructed to cast the vote of the entire Section for the officers nominated for the ensuing year.

The motion is seconded and carried.

Chairman Payne: Mr. Whitney will cast the vote for himself and the other members.

ADJOURNMENT.

Electric Railway Section

October 2 and 4, 1923

J. H. TRUETT, Chairman

Chairman, Safety Committee, United Railways and Electric Company
Baltimore, Md.

G. T. HELLMUTH, Vice-Chairman

Claims Attorney, Chicago, North Shore & Milwaukee Railway, Chicago, Ill.

M. W. BRIDGES, Secretary

Safety Engineer, Metropolitan West Side Elevated Railway Company,
Chicago, Ill.

TUESDAY MORNING SESSION

CHAIRMAN TRUETT: You are all familiar with the work the section has done in the past year. The activities have been marked. The bulletins have gone out from headquarters. We have secured a few new members, but I will not go into this matter, because it will be reported on by the membership committee.

The interest of this section is reflected by the number of those present at this session. One thing I want to mention is the increased support that the electric railways have given in the past year to public safety activities. We are going to have some papers on that score which will interest every man in this room. The healthy condition of the activities during the past year cannot but assist and affect the entire Electric Railway Industry.

REPORT OF SECRETARY

M. W. BRIDGES

The executive committee met in Washington, D. C. on February 15 with all of the officers present and all the committees either present in the person of their chairman or some one detailed by the chairman to represent the committee.

At this meeting, a committee on public education was created with Mr. Victor Noonan of the Cleveland Railroad as chairman. The duties of this committee was to handle the problem of educating the traveling public through the use of newspaper advertising, cards in cars, stations, terminals, on dash boards or wherever the committee would be able to secure space to spread the propaganda of accident prevention among the patrons of our railroads.

The membership committee reported, at that time, that they had completed a survey of the lists of members of the American Electric Railway Association and had compiled a list of 283 names of companies who were not members of the National Safety Council, each of whom were to be approached through the proper official of the company with the view of securing memberships in the Safety Council. The results of this work will, no doubt, be submitted in the report of the membership committee at this meeting.

The proposition of organizing a statistical committee was discussed and disapproved by the executive committee.

The monthly news-letter of the section has been sent out regularly by the secretary with the view of keeping the members in touch with the work of the section and its committees, together with such news items as were submitted by the members and the headquarters office of the Council. It will help a great deal during the coming year if the members will send the secretary such news items as will be of interest to the members, items regarding successful trials of Safety devices, methods of safe operation that have been successful on their lines and which can be adopted by other lines.

REPORT OF MEMBERSHIP COMMITTEE

GUY R. RADLEY

The membership committee met about a year ago and organized and adopted a plan of solicitation of membership by mail. Six letters have been sent out by the National Safety Council headquarters in Chicago to a list of something over 200 names taken from the Electric Traction Pocket List. Since the committee became active, 19 companies have joined the Council. Four have resigned; one was transferred, or rather resigned because they were getting benefits of the Council through an affiliated company; two have been transferred to this list from the Public Utilities Section, and that leaves us a total now of 126 in the Electric Railway Section.

REPORT OF BULLETIN COMMITTEE

A. J. VAN BRUNT

The chairman desires to express his thanks to the many gentlemen who, as members of the committee, furnished him with suggestions, drawings, and pictures to be used as bulletins; and to Mr. R. T. Solensten, supervisor of bulletins of the National Safety Council upon whom the burden of the work really fell. Mr. Solensten in his official capacity, acted as a clearing house for the many suggestions submitted and while the old adage says that "self-praise is condemnation," your committee feels that it has succeeded in furnishing material for better bulletins than have been previously issued.

All of you men present have seen the bulletins that were issued and your committee hopes that their work has, in the main, met with your

approval. There can be no question as to the absolute necessity for the work being done because bulletins are, without doubt, one of the most important of safety educational methods.

DISCUSSION

Chairman Truett: As a former chairman of the bulletin committee, I know the difficulty that Mr. Van Brunt has to contend with, and any one of you gentlemen will assist the bulletin committee in submitting good, live bulletins to the National Safety Council. Mr. Van Brunt will take these to Mr. Solenstein who will try to make a bulletin out of them and color it up.

Mr. Van Brunt: There have been one or two of the men who have submitted bulletins and because those bulletins were not used as submitted, or because it was impossible to use the particular ideas submitted, have felt aggrieved and have gone on strike, and we received no further bulletins from them. Now, that is childish. It is impossible for Mr. Solenstein to use everything that is sent in to him.

Chairman Truett: Do the bulletins contain the material you want, and are they of benefit to you? The meeting is open.

Mr. Haskins: I feel that the bulletin service was the best last year that we have had since I have been connected with the Council. I realize that it is a difficult matter to get up a bulletin for the Electric Railway Section, and it is a happy idea that meets the approval of all.

Mr. D. E. Parsons (General Manager, E. St. Louis & Suburban Railway Co., E. St. Louis, Ill.): I do not think there are enough of them. Another thing I want to say is that the Electric Railway Association is getting larger on the publicity end all the time. I suggest that the Safety Council cooperate with the others in the size of the bulletins sent out. For instance, in our cars and others all over the country, we have particular frames made to handle the bulletins inside the cars, and we try to make those frames of such a size that they will handle the standard size of bulletin or picture, and if there is cooperation all along the line it will save a lot of time and cost. It will look better, too, if all are of a uniform size. St. Clair is the publicity man of the American Electric Railway Association and I suggest there be some cooperation on that matter so the bulletin boards will be of uniform size.

Chairman Truett: A thought occurs to me just now. I wonder if it would be practical for each company represented here to send in to the Secretary of the section the size board he is using, just a letter saying that they use a bulletin board size so-and-so.

Mr. Parsons: There should be a standardization.

Secretary Bridges: I will follow this up in the monthly news letter. The information I get will be published there and sent out to all member companies of the Electric Railway Section.

REPORT OF PROGRAM COMMITTEE

H. M. KEYSER

When we considered the proposition of the program we thought it would be a little different if a letter was addressed to each of the electric railway members of the National Safety Council asking what they were most interested in and what they would like to have discussed at the Congress. About 25 per cent of the members replied, and the consensus of opinion expressed in those replies formed the basis of the program which we got up. So we might consider the subjects embraced in this program as complying with the requests of the member companies. In other words, it is not a program gotten up by myself and certain other men on the program committee. We tried to make every member of the railroad companies a member of the program committee.

Chairman Truett: In the absence of Mr. Anderson we have with us Mr. John C. Collins of the Los Angeles Railway, who will read Mr. Anderson's paper.

THE AWARD SYSTEM AS A MEANS OF PREVENTING
ACCIDENTS

GEORGE B. ANDERSON, MANAGER OF TRANSPORTATION, LOS ANGELES RAILWAY.
LOS ANGELES, CAL.

The individual engaged in rendering service to the public is under no greater obligation to render such service with due consideration to courtesy and safety than is the employer of such individual to recognize and reward fidelity to the principles underlying proper service. Each is under obligation to the other, but each is under greater obligation to the public receiving the service.

An inspection of the methods employed among street railway operators, generally, up to a comparatively recent period would seem to indicate a serious defect in the regulation and control of trainmen in the lack of an adequate system of checking and permanently recording those aspects of personal service worthy of commendation or reward, and those calling for disciplinary action. One very human consideration appears to have been overlooked by many street railway operators. That consideration has been *tangible, material reward for special service* rendered or for consistently superior service. The human consideration to which reference is made is money, which is the prime necessity of practically all men employed in service upon street cars.

There are other considerations, of course, and it is my pleasure to record the fact that in the experience of the transportation company with which I am connected I have found numerous cases, multiplying as time progresses, in which all doubt in regard to the material reward, having been eradicated by the excellence of the record of the individual, pride in his work and the permanent record of his work, has been the dominating influence in the daily routine of the individual. In other words, under the merit system established by the writer three and a half

years ago, many men whose records are such as to entitle them to the highest financial return, with practically no danger of any deduction from such reward, bend all their energies to keeping their records absolutely clear.

We find, further, upon a study of the methods in use up to very recent years by most of the operating companies that many penalties imposed on account of infractions of rules have been even less than "slaps upon the wrist." There are today in the United States many thousands of trainmen who have consistently and persistently violated certain necessary rules. Some have been penalized by suspension from service for from one to ten days in their records—but in their records only—such suspensions not resulting in the loss of a moment's time or a dollar in their pay envelopes. In thousands of other cases, men have been repeatedly notified that the patience of the superintendent had been exhausted, and that upon the next repetition of the offense, dismissal would follow, such ominous warning being followed by more warnings, instead of summary action. As the result of such so-called discipline, the individual involved was warranted in feeling a certain sense of security, regardless of the storm signals. He found himself under sentence that was never executed, threats that were never fulfilled.

The plan, at first opposed, even ridiculed, by some of the 2,500 men in the platform service, now apparently meets with the approval of practically all, the exceptions being some extra men not yet under the system and a few indifferent ones.

HOW MEN ARE RATED

No man is entitled to participate in the bonus of sixty dollars per year until he has been in the service six months. The amount of the bonus paid depends entirely upon the trainman's record under the merit system. During this probationary period, no man receives credits or demerits. On the day following the expiration of the probationary period the name of the trainman is entered upon the "efficiency record" card with a standing of 100 per cent. The bonus year begins December 1 and ends November 30. The bonus is paid by special check at a general assembly of the men, December 15, which date was decided upon because of the holiday needs of the men. To be entitled to the bonus or any portion thereof, a trainman's name must be on the payroll the last day of the bonus year, November 30. On that date all records are cancelled, and every man starts the new bonus year, beginning December 1, with a rating of 100 per cent.

Demerits are assessed for infractions of certain important operating rules. The present list of causes for credits and demerits is as follows:

List of Causes for Credits

(Each five to count 1 per cent on record.)

1. Accurate daily reports 5
2. Clear record for 3 calendar months 50
3. Exceptional act to prevent accident or injury 50

4. Practical suggestion as to betterment of service 5 to 15
5. Reporting dangerous conditions and practices10 to 30
6. Especial care in preparation of accident reports10 to 30
7. Especial attention to students10
8. Miscellaneous 5 to 50

List of Causes for Demerits

(Each five demerits to count 1 per cent off record. Demerits charged only when trainman is considered at fault.)

1. Discourtesy to passengers10 to 50
2. Collision of cars; collision with vehicle or pedestrian...10 to dismissal
3. Injury to passenger on cars10 to 30
4. Step accident20
5. Derailments and split switches10 to 30
6. Ejectments, disturbances and disputes10 to 30
7. Carrying passengers past destination10 to 20
8. Passing up passengers10 to 20
9. Failure to report accident50
10. Starting or backing up without signal40
11. Excessive speed40
12. Running ahead of time10 to 50
13. Failure to make prompt report of day's receipts10
14. Failure to collect fares10 to 50
15. Negligence in operation of fare boxes.....10 to 30
16. Failure to account for fares collectedDismissal
17. Failure to turn in lost articles promptly 5 to 20
18. Failure to report condition of cars10 to 40
19. Failure to make safety stop50
20. Failure to observe danger signals50
21. Failure to observe crossing rules 5 to 30
22. Improper operation of block-lights25 to 50
23. Laxity in calling streets 5 to 20
24. Leaving car unattended10 to 30
25. Leaving terminus ahead of schedule10 to 50
26. Miss relief10 to 30
27. Oversleep10 to 50
28. Absence from duty without permission50
29. Absent account of sickness without notifying office..... 5 to 30
30. Permitting money to accumulate on inspection plate... 5 to 30
31. Spacing10 to 30
32. Smoking while on cars10 to 25
33. Committing nuisance10 to 50
34. Untidy appearance10
35. Visiting with motorman while car is in motion10 to 30
36. Improper feeding of controller10 to 30
37. Wasting power10 to 30
38. Miscellaneous 5 to 50

The rules pertaining to safety and courtesy come first. Violations of these rules bring the heaviest penalties, and careful observance of them brings substantial reward.

FIND SAFETY RUNS HAND IN HAND WITH COURTESY

The operating heads of the Los Angeles Railway are demonstrating to their own satisfaction that under normal conditions a trainman who is courteous and considerate in his dealings with passengers is attentive to considerations of safety also. The transportation department has set forth very plainly that valid excuses may be offered for almost any failure except insolence or discourtesy, and most collisions between cars. Running ahead of time also is dealt with severely, as it is regarded as one of the most unnecessary and demoralizing practices and as exhibiting an inclination toward careless operation. A comparison of notes for three years or more indicates that the man who persistently runs ahead of time is a man who is inclined to take chances. To him, safety and courtesy are not primary considerations. His desire to "beat it" leads him into dangerous situations, throwing the "safety first" spirit into the discard. All other forms of dangerous operation likewise are penalized.

For some offenses demerits are cumulative. The first to be placed in this class was the vicious practice of running ahead of time. Cumulative demerits sometimes result in automatic dismissal, a man's connection with the company terminating when his rating on the merit card falls as low as 75 per cent.

When the system was first put in operation a motorman whom we will call Jim Huff, who had been with the company nearly twenty years, a personal friend of some of the officials, and rated as one of the best motormen on the road, made it a practice every trip to run up to the edge of the congested district a minute and a half to two minutes ahead of schedule. I examined Huff's record and found that he had been disciplined something like 200 times for running ahead of time. The sum total of his "suspensions" (on paper only) aggregated about three months. They were records of suspensions that had not cost him a single hour of time actually lost. He had received scores of letters, in seven of which he was sternly warned that it was the last he would receive—a direct threat of dismissal from the service. But the warning letters kept coming and Jim kept right on running ahead of time.

The bulletin announcing the establishment of the merit and bonus system was issued April 9, 1920. It read as follows:

"To foster efficiency, the existing method of discipline for trainmen will be discontinued and a merit system, or plan of 'discipline by record,' instituted effective April 10, 1920. Every trainman will start with a clear record.

"Credits will be given for meritorious service, such as alertness in preventing accidents, the exercise of good judgment in emergencies, making accurate reports and other acts worthy of special commendation. Demerits will be given when discipline is necessary. Each five credits

will count 1 per cent on record and each 5 demerits will count 1 per cent off record. Demerits will be charged only when, after investigation, trainman is found to be at fault.

NEW SYSTEM BROUGHT ATTENTION OF OLD TRAINMAN

"Ratings will be made upon reports from division superintendents, supervisors, patrons and other sources. A rating of 100 per cent will represent the maximum of capacity, efficiency, service and conduct. A rating of 75 per cent will represent the minimum of capacity reasonably allowable. A rating below 75 per cent should represent a standard of service, capacity and conduct below any reasonable requirement and will be sufficient cause for dismissal from the service.

"If, upon investigation, extenuating circumstances are found to exist and reinstatement is approved, the trainmen so reinstated may resume his duties with a standing to be determined by the head of the department.

"An accumulation of markings above 100 per cent will be sufficient cause for special consideration of trainmen.

"The ratings will be entered upon individual cards and each record may be examined at any time by the man affected.

"As an incentive to trainmen to maintain the highest possible efficiency, the company has set aside a fund based upon an award of \$60 per year, or \$5 per month, covering the period from April 10, 1920, to November 30, 1920, inclusive, for each man in the service coming under the operation of this rule, which will be paid on December 15th, 1920, to each man in the service on November 30, 1920, who has a clear record and has been continuously in the service of the company for the entire period; and the proper proportion of this amount to those who have a clear record and have been in the service of this company for more than six months and under eight months; or the proportion of such sum as has been earned.

"All records will be balanced monthly and the percentage of efficiency determined thereby. This efficiency rating for each month will determine the proportion of the maximum amount to be credited to each trainman for that month.

"Such portion of the total amount set aside for distribution as may not be absorbed through the operation of the foregoing plan, by reason of the failure of any trainmen to attain ratings entitling them to the extra money, will be applied to a fund for the relief of all employees."

(A deduction of 25 cents is made for each one per cent below the 100 per cent standard for any month. Example: A rating of 95 per cent leaves \$3.75 due the trainman for that month.)

A few days after the posting of this bulletin a supervisor reported Huff 90 seconds sharp at T— street. Next day the old-time offender received a blue slip notifying him that 10 demerits had been lodged against his record under classification 12 of "causes for demerits." The penalties were 20 demerits for the second offense within a month, 30 for the third, 40 for the fourth, 50 for the fifth, with automatic dismissal within easy reach.

Huff laughed. "Not for me," he confidently assured a friend. "That stuff may go for some of the new men, but I've been sticking around for 19 years. I'll go up and see the boss."

But he didn't—at first. He wrote a seven-page letter extolling his virtues and explaining why it was absolutely necessary for him to get to T— street from one and a half to two minutes ahead of schedule time. Then he called upon the manager of transportation and dilated the story in his letter, but without success. He was told he had deliberately violated an important rule, was arguing himself into belief that his own judgment should prevail, that he was taking the attitude that he had the right to make his own schedule, and was endeavoring to establish a precedent which would have a demoralizing effect, especially upon younger and less experienced men. For six weeks he struggled in vain to secure clearance of his record by invoking aid from various quarters, but was met everywhere with the suggestion that the only way he might hope to retain his job was to observe a necessary rule laid down by the management and not attempt to make a new rule to fit his own particular case.

He never ran ahead of time again.

MEN TRY FOR GOOD RECORDS

John C. Collins, supervisor of safety for the Los Angeles Railway says:

"The Merit System puts into the hands of the safety man a leverage whereby he may exert pressure with degrees of force to produce certain results with different types of men. It makes it possible for a trainman to earn \$5 a month more than his regular salary, which means that the best men are paid more than those with poorer records. It pays a man for doing good work, and penalizes him for not trying. It is an unseen force which encourages the worth-while man to greater effort, while the habitually careless must either improve his habits or of his own volition eliminate himself from the service.

"The safety supervisor instructs the individual in the safe operation of cars and the proper interpretation of rules.

"All accidents are checked as to responsibility and from the viewpoint of a trainman. They are either not responsible or the accident is classed as preventable; or it is checked with some degree of responsibility to the trainman. If not in any way responsible, a man receives a clear safety record for the month. If an accident is classed as preventable, although the trainman did not have a chance to prevent this particular accident, the man loses his clear safety record for the month. This penalizes him 10 credits.

"The men fight for this clear monthly record and come to the office to explain that they are not in any way at fault. The supervisor of safety can usually show them where they made a poor word picture in their report, which means better reports in the future. The average trainman has a short memory. Charging him with 30 demerits enables him to remember more clearly and for a longer time.

"Some men have many slight accidents, although apparently not at fault; have been instructed, but fail to improve. After demerits are assessed for careless operation, immediate improvement is noticed.

"A man may have many slight mishaps, so that he does not pay his way. Demerits usually make this type of man pay. Some men have accidents in regular cycles. We use the first responsibility accident as a basis for assessing demerits. This breaks the cycle and the man's accidents are more irregular after that. If a man has a second or third accident for which he is checked as responsible, the number of demerits is increased with each succeeding accident.

MERIT SYSTEM ONLY LOGICAL WAY TO ADMINISTER

"Some men are over-anxious to build up a high record for efficiency. The perfect record is clear courtesy and safety for the year, no demerits having been assessed and no credits for doing things out of the ordinary line of duty."

Anything affecting the pocketbook of the average wage earner is of immediate interest, but as has been shown the amount of cash a trainman receives at Christmas time is not the greatest spur in all cases. In many other cases trainmen have exerted strenuous efforts to eliminate or counterbalance demerits, but not until the percentage of efficiency fell below 100 and meant actual monetary loss to them.

Mr. R. R. Smith, assistant superintendent of operation, who is in charge of the administration of the Los Angeles Railway's merit system, states that a comparison between the handling of discipline under this plan and the haphazard methods which prevailed before its adoption proves conclusively that the merit system is the logical way to administer discipline. But as we profit by experience, he finds it necessary from time to time to make certain changes.

Properly administered, the base of the system is a balance sheet which directly reflects the efficiency of the man in question and at the same time provides a permanent record indicating whether the man is making an effort to improve his work as time passes. The men now regard this record as a ledger account with the company, the debits representing that which is owed the company in the way of service and the credits representing payment made in the form of efforts to render efficient service.

The ideal plan, toward which we are working, is to place the records in charge of one competent person who can devote all his time to the administration of the system, follow up recommendations for discipline as they are received, increase penalties in cases men are shown to be repeaters, and fix a definite length of time for demerits to stand, after which, if it be proven by the record that the man has profited by the assessment of such demerits and has not repeated the offense, the demerits will be automatically cancelled.

ACCIDENTS DECREASE WHILE POPULATION INCREASES

If there has been one mistake a little more surely demonstrated than the others during the first three years of the operation of this system

it is that of having been too generous in the award of credits. It has been found in some instances that men with high efficiency ratings, but with some demerits, are disposed to treat demerits slightly after attaining what appears to be a position of security, so far as the bonus is concerned. Such men are disposed to make no appeal on account of demerits assessed until after their efficiency rating has dropped below 100 per cent, when they immediately appeal, in some instances even admitting that they do so because their rating has dropped to the point where it prevents them from earning the full bonus. These short-sighted men, of course, lack the proper spirit of service, but they are not numerous.

Generally speaking, during the past three and a half years, the number of accidents and the volume of claims and damages on the books of the Los Angeles Railway have shown material decrease year by year, although during that period the population of the city has increased approximately fifty per cent, the number of cars in service has increased 26 per cent, the daily mileage has increased about 10 per cent, the number of passengers carried upon the street cars has increased over forty per cent. Just how much of the credit for this rather remarkable showing should be awarded to the merit system is hard to determine, but that the plan has operated effectively to reduce accidents of all classes is admitted by all observers, including those authorities who at the beginning were the most skeptical. The degree of success to be attained through the application of the idea is influenced largely by the character and personality, particularly the temperament, of the individual intrusted with the responsibility therefor. It is highly essential that such authority be a man of firmness, poise and self-control, possessed of capacity for judging men, and actuated always by a spirit of justice.

Below are shown specimens of forms used in notifying trainmen of credits or demerits placed on their record.

NOTIFICATION OF CREDITS

Div. No. _____ Date _____ Cap No. _____
To _____

It is a pleasure to advise that you have been awarded _____ credits under Classification shown herebelow, as per list of Causes for Credits and Demerits posted at your Division. Should you desire further information as to the report upon which this action is based, you may obtain it by consulting your Division Superintendent.

Classification No. _____ Date Occurred _____ Place _____

The award of these credits places your Efficiency Record at _____ %

Supt. of Operation.

NOTIFICATION OF DEMERITS

Div. No. _____ Date _____ Cap No. _____
To _____

This is to advise you that _____ demerits have been placed against your record under Classification shown herebelow, as per list of Causes for Credits and Demerits posted at your Division. Should you desire further information as to the report upon which this action is based, you may obtain it by consulting your Division Superintendent.

Classification No. _____ Date Occurred _____ Place _____

The assessment of these demerits places your Efficiency Record at _____ %

Yours truly,

Supt. of Operation.

Below is shown specimen of efficiency card showing history of a motor-man which resulted in his automatic dismissal from the service, reinstatement after this severe discipline and immediate improvement in personal service.

TRAINMAN'S EFFICIENCY RECORD

NAME		CAP NO. 3985		DIVISION NO. 6			
Disciplined For		By		Cred-	De-	Per	Bonus
Date	Fiscal Year 12-1-22 to 12-1-23			its	merits	Ct.	
Dec. 17	8 Reported accident and secured witnesses 12-12-22.....	Ax. 2878	15			103	
Dec. 28	2 12-20-22.....	Ax. 3594		20		99	
Dec. 31	Courtesy only.....	R. B. H.	10			101	5.00
Jan. 2	38 Ran over stop sign 18 ft. 12-18-22.	A. K. P.		10		99	
Jan. 8	8 Reported accident and secured witnesses 12-26-22.....	Ax. 3840	15			102	
Jan. 8	8 Reported accident and secured witnesses 12-27-22.....	Ax. 3898	15			105	
Jan. 8	38 Missouts 12-13; 1-3; 1-4.....	Supt.		10		103	
Jan. 27	12 1-18-23.....	Super.		10		101	
Jan. 28	12 1-24-23.....	"		10		99	
Jan. 31	No clear record for courtesy or safety.....						4.75
Feb. 16	Put at foot of extra list for 3 days because of missout.....						
Feb. 18	12 2-14-23.....	Super.		10		97	
Feb. 18	Courtesy only.....	R. B. H.	10			99	4.75
Mar. 9	Put at foot of extra list for 3 days because of missout.....						
Mar. 29	2 3-22-23.....	J. C. C.		20		95	
Mar. 31	Courtesy only.....	R. B. H.	10			97	4.25
Apr. 5	38 Missout 3-28-23.....	Supt.		10		95	
Apr. 23	Put at foot of extra list for 3 days because of missout.....						
Apr. 30	Courtesy only.....	R. B. H.	10			97	4.25
May 7	38 Missout 4-24-23.....	Supt.		10		95	
May 14	12 5-11-23.....	Super.		15		92	
May 17	12 5-14-23.....	"		20		88	
May 20	11 and 31 5-16-23.....	"		25		83	
May 23	12 5-18-23.....	"		25		78	
May 24	11 5-20-23.....	"		20		74	
May 24	Automatically dismissed because of record below 75%.....						
May 25	Reinstated with efficiency rating of 100% after appeal to.....	R. R. S.				100	
May 31	8 Reported accident and secured witnesses 5-25-23.....	J. C. C.	15			103	
May 31	Courtesy only.....	R. B. H.	10			105	5.00
June 30	Courtesy and safety.....	R. B. H.	20			109	5.00
July 12	8 Helped disabled car 7-9-23.....	Super.	15			112	
July 31	Courtesy and safety.....	R. B. H.	20			116	5.00
Aug. 20	8 Helped at accident 8-16-23.....	J. C. C.	10			118	

DISCUSSION

Mr. Van Brunt: Has that method had the effect of creating a large number or any excessive number of unreported accidents?

Mr. Collins: We have very few unreported accidents. The number has been decreased rather than increased.

Mr. Parsons: Every accident has to be analyzed?

Mr. Collins: We have one man who does that. He follows a straight system and if he makes a mistake in checking responsibility on an accident report the first time, it is rechecked with the claim department and the accident is filed. In two or three years we have had but two or three

cases where the claim department has paid out for an accident where we checked it. We get the man in there and find out why he was to blame for that accident.

Mr. Barnes: I wonder if you have tried to work out the system for other departments, track lines, etc. It strikes me as much more difficult but I have not found any one who has even made a start in that direction.

Mr. Haskins: We have not worked out the thing in exactly that light but we have a system that is employed in the other departments. We call that a contest system. Our power and sub-station and shop, line department, motorman and conductors are all grouped in that and will come in under the benefits of the system.

Mr. Barnes: We have worked out a contest in Louisville, too, but we do not believe in cash bonuses. I think the general impression is that there is more in the world than money. We have developed a system of monthly dinners for the men entitled to that. Those who can make the highest mileage per accident are entitled to the dinner. If they are victors in the second month they are entitled to bring their wives to the second dinner. The other departments have a chance at those dinners by reducing their own accident records. That is to say, if a department in this three months' period has a record of 25 fewer accidents than the last three months we give them a dinner, too.

I am interested in this bonus proposition because dead level wages among trainmen has struck me as an inherent weakness in their business, and I am interested in all plans giving opportunity to differentiate and pick out or reward the more efficient employees.

Mr. Collins: The first year we started our system the claim department paid out about \$15,000 less than it had paid out the previous year. I think for the last year 2.35 per cent was the gross, and when we first started we did not hear a word about safety.

Mr. Keyser: About three years ago we put into operation a safety contest to be participated in by motormen and conductors. I think you gentlemen will all agree with me that the proof of the pudding is in the eating thereof. It does not make a great deal of difference what the system is, but the results themselves are the things that count. I am going to take the liberty to read the results up to and including the second safety year in these classes of accidents which are most common in the electric railway industry.

The total number of accidents for that period decreased 24.6 per cent. Claims decreased 24.5 per cent during that period.

In the two years that we have conducted our safety congress as compared with the two years previous in which there was no safety congress as follows collision of cars decreased 66.7 per cent.

No report or blind accidents, (perhaps the most demoralizing type of accident that the claim department can be confronted with, because they never know whether there is any merit at all due to the condition of the claim) were reduced 47.8 per cent.

Serious injury cases, those demanding possible treatment where there is some real tangible injury, have decreased 42.0 per cent.

Injuries not serious, which, of course, have a miscellaneous class including all others, decreased 24.6 per cent.

Deaths, including all passenger, employees, death to pedestrians, etc., decreased 4.7 percent.

AWARDS CASH AND UNIFORMS

We have a system where a man is given a cash prize of \$5 if he goes through a quarter without having an accident or is not charged with misconduct, such as incivility to patrons. If he repeats that performance through the four quarters of the year in addition to \$25 which he receives he is presented with a new uniform. I have the figures here. The first year we handed out 375 new uniforms and 2,833 awards of \$5 each, and the second safety years we gave out 333 uniforms and 2,270 \$5 rewards to the trainmen.

There are a few other factors entering into the decreases which I have mentioned, and I should say that Washington during the war period held rather a novel situation, as it was the capital city of the United States. and of course, many thousands of people flocked there seeking government employment, and a good many soldiers were there as the result of the draft.

Now I notice that Mr. Barnes said they gave the men dinners down in Louisville. At the end of each quarter we give a dinner to all the trainmen and at that dinner a banner is presented to the winning division of transportation who have enjoyed the greatest decrease in accidents. That has nothing to do with the cash award and the uniforms. The cash or uniform appeals to the men individually, while the banner appeals to them collectively. We find that the trainmen take as much interest in the awarding of the banner to their division which does not mean a cent to them as they do in the \$5 cash prizes and the uniforms, which is a monetary consideration. When you get that result safety is no longer a theoretical proposition but has become an accomplishment.

APPOINTMENT OF NOMINATING COMMITTEE

Chairman Truett: Gentlemen, I am expected to make the announcement of the nominating committee at this session. I will appoint the following on that committee:

Mr. A. W. Koehler, Rochester, New York
Mr. B. D. Haskins, Chattanooga, Tennessee,
Mr. D. E. Parsons, East St. Louis, Illinois.

They are requested to make a report at the meeting on Thursday morning.

It occurs to me that this subject of awards is too vital a subject to pass by with just a paper. That is my personal feeling. What do you think we should do? Do you think the secretary should pass it over to the

incoming officers for further study? Do you think something should be crystallized along that line and more information gotten together for the good of the section?

Mr. Hellmuth: We have a gentleman here who is just starting this system, Mr. Restofski of the West Penn Railway.

Mr. Restofski: We started on the West Penn Railway system the first of the year with a contest plan; not a cash award. We divided the trainmen in every division into teams, the number of men on the team varying with local conditions, and that team that comes through each quarter with the least number of accidents is given a dinner by the Company. That is a regularly quarterly affair, and from that plan we got into the cash award system because the contest plan does not give a reward to the particular individual who is on the losing team. He is simply out of luck, the same as a poor baseball player on a team. Our plan roughly is this: a motorman or conductor who goes through the four quarters without an accident gets a cash award of \$1. This is increased \$1 each month up to the tenth month. This goes on indefinitely. If he goes through the whole year the company adds an extra payment which makes a total of \$100 for twelve months. If he goes through the second twelve months he gets \$120; if he goes through the third he gets \$150. Any time he has an accident he drops back to the foot of the list and starts in with the \$1 award again.

We have not been at this long enough to give any concrete definite results, but we do know that there has not been anything we have ever done in regard to accident prevention that the men have been so interested in or have talked so much about as the team contests and the award plans. The Wheeling Traction System has recently adopted a cash award plan based on the West Penn plan.

Mr. C. B. Proctor (Memphis Street Railway Co., Memphis, Tenn.): We put in a plan commission the first of June, but it is quite young yet. We arrived at the actual cost of the work, figured what the average was for the past three years, taking up to, I believe, the last 18 months which, under peculiar conditions, were very good. Then we said to the men, "Now your average accident cost is a certain per cent of the gross, everything that you will cut under that per cent will be divided between you and the company on a basis of fifty-fifty, and working it in a period of three months."

We used a figure of 4¼ per cent and we worked it for three months (the three months ended the first of September) and it gave \$6,100 to be divided on a man-hour basis. It made a sum of about \$10.50 on the average. I believe it ran from \$16 or \$17 down to 10 cents. That is the plan that we think meets the situation with us and we look for good results from it.

SHOPWORKERS SHOULD BE REWARDED

Mr. D. Wire (Chicago, Ill.): A great deal has been said about accidents that have to do with transportation, but nothing has been said about accidents that start in the machine shops or in the mechanical end

of the work. In the shops of the Chicago Elevated Railways we have a system that might be classified as a bonus system, in the discovery of loose tires and loose wheels, which if allowed to remain on the cars which go out on the road, would cause accidents. I think something might be said along this line.

COMMITTEE TO STUDY AWARD SYSTEMS

Secretary Bridges: I may suggest that it is within the province of the section secretary to ask that special committees be appointed to cover certain subjects during the coming year, and report back at the next meeting. That has been done from time to time in the Electric Railway Section. This committee has the entire year to work on the subject, and can take it up with the different roads and report back to us at the next meeting of the Congress. If nobody else wants to be the goat I move that such a committee be appointed.

The motion was seconded and carried.

Chairman Truett: Then the committee will be composed of the following men:

Mr. Hadsell, Chairman
Mr. Haskins
Mr. Restofski
Mr. Barnes.

THURSDAY MORNING SESSION

Chairman Truett: I will open this session by asking the nominating committee to make its report.

Mr. A. W. Koehler: The nominating committee desire to place in nomination J. P. Barnes, president of the Louisville Railway Company of Louisville, Kentucky, as chairman; H. M. Keyser, secretary and claims attorney, the Washington Railway & Electric Company, Washington, D. C., as vice-chairman, and Mr. Melvin W. Bridges, safety engineer the Chicago Elevated Railroads, Chicago, Illinois, as secretary.

Mr. A. J. Van Brunt: I move the report be received and the committee discharged.

Motion seconded and carried.

Mr. C. W. Proctor, (Memphis, Tenn.): I move that the secretary be instructed to cast the vote of the body for the nominees.

The motion was seconded and carried unanimously.

CO-OPERATION OF ELECTRIC RAILWAYS IN COMMUNITY SAFETY ACTIVITIES

Round Table Discussion

Mr. Julian Harvey (Kansas City): I can remember back just five or six years ago when the term "Community Safety" was first coined. A good many years before that transportation companies had been considering, naturally, the matter of accident prevention, but they had not

sensed it in the light of there being a necessity for a community effort along that line. They were going their individual ways, attempting to do what they could largely through their employees, in bringing about a reduction in accidents, but it was only at the time that the National Safety Council began the organization of their local councils and paid staffs in the various cities that we began to look on this matter as a community effort, and I think that the development we have seen in the last five years along that line augurs well for the future insofar as the street railway business is concerned, along this particular line.

It is interesting to know that at the present time there are 33 cities in this country having local safety councils, and it seems to me that there is no argument—in fact, it is hardly necessary for me to mention a thing of this kind—but it is through the local council in the community that the transportation company must look to see results accomplished.

Our cities naturally divide themselves into several classes. Those cities such as Baltimore, St. Louis, Cleveland and others, where local organizations already are doing intensive community work; next there are those cities of populations sufficient to warrant the organization of local councils and the carrying on of concentrated effort; and then those smaller communities where possibly such an organization is not practical. But I think the transportation men should thoroughly realize the advantage of a local effort where representatives of all the various business organizations in that particular community are brought together into one body like the safety council which is absolutely non-commercial in every respect, which has absolutely no axe to grind, and has but one aim, and that is the reduction of preventable accidents.

Insofar as the smaller communities are concerned, where it isn't practical to have such an organization, you can hardly conceive of a place being so small but that some organization could not be formed.

SURVEY OF CONDITIONS URGED

I realize that you men here this morning are all definitely interested in that work. The point I want to make is this: that I wish that we could get all the traction men throughout the country, those who have not taken sufficient interest in this problem, to be with us this morning. Undoubtedly there are many not here who are interested, but if we could get a full expression from all of them, if we could take to them a definite knowledge of what has been accomplished, I think it would open their eyes as to the possibilities, for after all is said and done, we are not sold 100 percent on this problem. Consequently, I would suggest the preparation of some definite data from these cities where community efforts are carried on with the idea of presenting in tangible form to these companies who are not carrying on this effort, just what has been accomplished through it.

I come from Kansas City, of the Middle West, and I want to say that they can succeed. What has come to our local work there has been in a measure due to not only the financial support of the local traction company, but to the whole-hearted and enthusiastic support which has

been given us by the officials of that company. When I say enthusiastic support I mean by their general manager, by their superintendent of transportation, by their other departments putting men on our various committees and not only giving us their advice but by actually getting out and doing the definite work that we must necessarily ask them to do.

It makes no difference whether that effort may be selfish or unselfish, the main thing is that we want to get the results, and we have gotten them through that effort.

I know that in a great many cities they are doing the same thing, but we want to keep on and on until there can be no question but that all railway men are taking the same active interest in their community work.

Mr. D. E. Parsons: I would like to know what your budget is for a city as large as Kansas City; if you have any trouble in raising your budget? I am vice president of the St. Louis Council and I know right at the present time financially they are in better shape than they have ever been. It has always been a problem as to whether their finances were going to hold out or whether we would have to go knock somebody down to get more money.

A local safety council secretary or manager shouldn't be bothered with the finances of a community affair because if he does he is taking up his time on finances when he should be spending his time on propaganda or other good work that the organization is created for.

Mr. Harvey: We have a budget in Kansas City of some \$20,000 a year. There are in Kansas City, as in other cities, a great many civic organizations—Rotary Club, Lions, Kiwanians, engineering clubs, K. of C.'s, etc., and we called on each of those organizations to appoint three or four representatives who would not only represent them in the safety council organization but who would do some work. I will frankly tell you that the first year we tried that we got the representatives alright but when he went out to raise money we found that those men were sold on safety but were not sufficiently acquainted with it to go out and tell the story, as it should be told. As a result, in the first instance we had some little difficulty in raising the amount of money that we desired. In fact we did not raise all that we desired, but we did get a sufficient amount to carry on quite a bit of work and consequently we devoted our entire efforts to the public safety work. It was the record that we had made—the wide-spread knowledge of safety and what we could do that had been carried home to parents by schoolchildren that enabled us to go out about six months ago and raise two and a half times as much money as we raised last year, with a great deal less effort.

We work strictly on a budget system. We make each month a financial statement showing the condition of each department of that budget, what the budget was for the year, what they spent to date, how much was left unspent, and by making it strictly budget, having a little contingent

fund which we can transfer to various branches of our work, we don't go far astray on the thing, and I think that the third year will be even easier for us because the cumulative effect of it cannot be denied.

But I would say to any community where you contemplate an organization of this kind, go out with the idea of making your organization a representative one. Get people to serve on these committees, representing various organizations. You can pick men. Don't pick a man simply because he is an outstanding figure in the community, but pick him because he does stand well in the community and, in addition, is willing to give a little time and a little effort to the work. I have found this very encouraging thing, that we had much less difficulty in getting men to serve on these various committees the second year than we had the first because we had become better known. The average individual wants to tie up in his civic endeavors something worthwhile and something popular.

Mr. Scott: The properties with which I am connected operate, many of them, in small towns which are not comparable to Kansas City or Chicago or Cleveland or any of the larger cities. You take, for instance, an interurban property that runs through some dozen or so towns—small towns—where it would be impossible to organize a local council such as has been described by the gentleman from Kansas City. I found that in those smaller communities it is not difficult to interest the citizens in the safety work that you desire to carry on in the community in which you operate. Neither is it expensive, and in the smaller towns such as I refer to you can usually get the results, perhaps not so satisfactorily, but at least good results, by voluntary service, by getting together a committee of citizens, citizens who are prominent in civic affairs, having them, in an organized way, carry on safety in that community. The same plan would apply to an electric power property operating in a number of communities. I think that the utilities, as a rule, fail to take advantage or appreciate the opportunity they have in getting the co-operation of these smaller towns.

I believe that a local council and the safety work that is carried on in the community, depend almost entirely upon the ability of the managing head. I have had experience with local councils such as Mr. Harvey represents and it has been my observation that they succeed where they have the right fellow at the head of them, and that they fail wherever they have the wrong fellow at the head of them, and so, in carrying on the safety work in the smaller towns, in order to assist the electric railway, it depends largely upon the qualifications of the man who is trying to put a thing across, and if he knows how, and goes about it right he can do it. If he is indolent about it, if his heart is not in it, he fails. But in almost every instance it is due to the fellow who is trying to put it across.

I believe that the thing we are talking about—getting the interest, the public interested in safety—is the big problem of the electric railway industry. If you don't appreciate it today, you are going to appreciate

it a year from now, and when you come to this Congress a year from now you are going to find that the trend of the program—the trend of the thought that is presented—is getting ahold of the public, and if you don't do anything else but you go back home as a result of this program, except to go back with the determination to get into the community in which you operate this organized effort towards safety, then your company is paid a thousand fold for the time and the money that was spent in having you attend this Congress.

EXPERIENCE OF MASSACHUSETTS SAFETY COUNCIL

Mr. MacBrayne (General Manager, Massachusetts Safety Council): A majority of the street railways of Massachusetts are supporting financially the Massachusetts Safety Council, consequently it was a part of my program to develop some service to the street railways. We brought that about by calling together first a committee representing nearly all of the street railways and asking them to report their accident experience as it related to automobiles for six months. That gave us 7,000 accidents and an opportunity to analyze them, and discover that our first hazard was the automobile shooting out of the side street; our second the automobile cutting in front and failing to estimate the speed of an automobile ahead of it or the fact that that machine might drop its speed, and force the collision.

In going before the public we said: "Wherever there are 7,000 collisions there are personal injuries, and we are interested as a safety council, in reducing those personal injuries.

We began the development of a publicity program along these lines: I have a tieup with 45 of the leading newspapers in the state and furnish them from time to time, series of articles, sometimes an article every day for two weeks, on "The Safety of Your City," syndicated, giving it almost the same position and the same heading, with exclusive use for the paper in that territory. Those articles were so distributed that they covered all the phases of public hazard, but we also had one or two strong street railway stories in that group. Then we placed in 2,000 school rooms a little booklet called, "Let's Make Our Street Safe for the Children," containing safety stories, and one of those 10 safety stories was the story of the street railway.

We used, this summer, a film you may have seen here, "Why Are We Careless?" which, when the film was made in Boston, we were very careful should include the hazard to the child of the one-man car which had given us quite a group of accidents—the person who runs in front of automobiles, and the person going around the front of the car. We have used that film since June 1 and have organized meetings attended by 50,000 children at which that film was shown. That has not been limited to the City of Boston. We have used it in nine Massachusetts cities already.

We have also placed in the hands of motorists this year a little booklet, "What You Need to Know to Drive in New England," issued by the Safety Council, containing the changes in the traffic laws, but tucked

away in it, one or two important facts that in many of our cities in Massachusetts it was a local requirement that the motorist should get out of the way of the street car when he is asked to do so by the motorman, and also calling attention to the fact that a great many motorists do not realize that and dispute the fact, when the right-of-way belongs to the road.

LETTERS WRITTEN TO MOTORMEN BY COUNCIL

In a part of a general publicity campaign of newspaper articles at a time when we had an increase in the direct collisions, I said to the general manager of several roads: "If your motorman will report to me the number of the automobile that cuts in on him, or comes out from the side street under conditions that would have caused a collision we will write him, what we call a "friendly letter." Now that served two purposes. We said first to the motorman: "Of course it is up to you to go the limit on preventing accidents, and it is up to you to do more than your half when some fool driver does run in under conditions that make the accident almost unavoidable." Then I began to get reports from all over the state—motorman on such a day, under these conditions, car number so-and-so did this thing, and we sent out to them from our office a "friendly letter" in which we said: "We don't believe that you are aware of the fact that in six months there have been 7,000 collisions with automobiles, many of them attended by personal injuries. We ask your co-operation in lessening this hazard in Massachusetts."

This year we have worked out a new thing. We just finished a safety week in the city of Lawrence, put on by an automobile club of 1,500 members. A committee of 50, headed by the mayor, but entirely planned and directed by our council, carried it out. In our list of speakers we not only had a cracker-jack traffic man who represented the police department, speaking almost daily, but we took the president of the carmen's union, who is a good talker, and a motorman, and we put him out to discuss accidents that the motorman cannot prevent. He addressed a great many meetings—meetings at which the majority of men were motorists; meetings of working men who drove cheap cars, and he said in a perfectly bright, frank way: "I am a motorman, and I know sometimes we slip up, but these are things that I see that I cannot prevent."

In the City of Boston, on Monday, we will open a show which will be attended probably by 100,000 people in the nine days it will run. As I happen to have the committee on public safety in our exhibit we have the street car and automobile worked out in models—a street car nine feet long and an automobile four feet long. We will have on our list of five-minute speakers, at our exhibit each night and each afternoon, a motorman giving a plan, frank talk. The point is, of course, that if the general manager of the road came out and spoke, they would say: "Of course you are trying to save money for the road."

It is necessary in getting our public contact, to say: "Here is one section of the public saying to another section of the public, 'For God's sake, be a little more careful because we are contributing to this great total of accidents in the state.'"

At our State Conference, held in Springfield in April, we took the topic of "Collisions," and assigned the street car end to a general manager and the automobile end to a motorist, and we said to them, "Make this a friendly discussion. Let the street railway tell what it thinks about the motorist and let the motorist tell what ways the motorman can help."

The general manager to whom that topic was assigned went back to his own road in the city of New Bedford, and said: "You fellows who drive the cars, give me the material for my speech." Consequently when he got up to speak he said, "I am not expressing my own opinion, here is the testimony of my own men, and the men were so fair about it that after telling what the motorist should do they added what the motorman could do also." When we got the automobilist to discuss it he admitted that the street car had the right-of-way. That article, as a part of our publicity, we reprinted in some five or six automobile journals, with a total circulation of perhaps 150,000, and used it in newspapers where it reached a very large number.

SUCCESS COMES FROM PROPER PUBLICITY

In using the National Safety Council's automobile lessons this year, one or two of which dealt with the street car, we adopted that whole series to our own needs and scheduled them so that for 21 days we had 800,000 people in Massachusetts in their own newspapers, reading those articles.

I am myself satisfied, from the reduction we are obtaining in certain types of street railway accidents, that we are working upon the right plan for further development. Wherever we have worked out any piece of publicity or any series of meetings a section of the program will include the street railway, and it is more valuable, in my opinion that if we had set the whole program up for that, because while we keep it a community proposition the public realizes its responsibility, and after all, "Old Bill Baystate," as the public calls one of our street railways in Massachusetts, has his troubles, and the public, which was cursing him five years ago, is beginning to feel a little friendly towards him, and is willing to admit that the public, after all, owes a certain amount of co-operation to this carrier.

Mr. Hadzell (Rochester, N. Y.): I believe that, as Mr. Scott has said, relative to getting results, it depends a great deal on the manager of the council for, if the proper methods are used and policies carried out through these suburban towns and in our cities, we can accomplish a great deal.

Mr. Barnes: Quite a little has been said about the safety council viewpoint towards this problem, and I think that something ought to be added here about the electric railway approach.

I think it is a foregone conclusion that the electric railway ought to cooperate in all safety council activities. That cooperation should be not anonymous, but modest and I am a very strong believer in the value—the practical value of giving credit for safety results to the platform man—to the men who actually do the operating rather than to the officials of the company who have served on the committees.

Now a case in point, by way of illustration—last Christmas time I happened to be lunching with the president of our local taxicab company, and he said: "Barnes, I have been looking over the records of our drivers and we have 24 men in our employ who have driven the entire year of 1923 without an accident," and then he said, "Some of them have gone as high as three and four years without an accident, and I am trying to figure a way to recognize those men publicly, and I believe that some noon-day, during the holidays, between Christmas and New Years, I will have 24 taxicabs lined up and drive a parade through the business section of town with those fellows driving the taxicabs, each cab with the name of the driver on it and the statement of the length of time that he has run without an accident."

I said, "That's fine, whom are you going to have for passengers?" He said, "We are not going to have any passengers." I said, "You are wrong, you are going to have for passengers the men who have driven street cars in Louisville in 1923 without an accident." We went over our records and we found that we had 96 of those men, and we had several truck drivers who had driven without accidents. We put them into the parade, and it made a very impressive pageant, one of the best that has ever moved through the streets of our city.

We had in addition to that, so that all might see it, photographs taken of every one of those men and together with the taxicab and the railway company, for the first time in the history, took a full page of the newspaper—the front page—which mentioned the name of neither company, but which carried the photographs of these 24 taxi drivers and the 96 motormen with their names and the legend: "These men have driven a whole year, carrying passengers in the streets of Louisville, without one accident. It can be done." And the advertisement was unsigned.

Now, I don't believe that any newspaper space that we have ever paid for before that gave us so large a return in popular good will, because the attention was directed towards the men who had done the thing, and time and again people, in getting on a car would recognize the man on the car as one of the men whose picture they had seen in the paper, perhaps even repeating their names.

The Courier Journal and the Hener Mathewson papers took the proposition up and the idea appealed to them so that they organized what they call the "Life Savers' Club." They said any man that drives for a complete year in the streets of a busy city without accidents is a life-saver indeed, and so we have an organized club. The membership qualifications for this are that a man has driven a calendar year some kind of an automotive vehicle as a means of his livelihood without accident.

We gave a dinner to the motormen and taxicab drivers who were charter members of the Life Savers' Club and they were given a most stirring address by the Episcopalian Bishop of Kentucky. They had a good time, there was a splendid spirit manifested, and the proposition was thrown open to other drivers of delivery trucks and any vehicle driven as a means of livelihood, and there were about 250 members in that club. Membership next year will be dependent upon the record for 1923, and I expect that the dinner will be an annual affair. It was a fine thing and a fortunate thing that a great newspaper took up the proposition instead of leaving it to the Safety Council or to one of the companies concerned.

The point I want to make in that regard, is that both the taxicab company and ourselves got more good out of that proposition because we were not too prominently identified with it. It was our employees and not our management that put that thing over, and that gave it a stronger popular appeal than could have been given in any other way.

We are doing many things in the way of cooperating with the Safety Council. It happens that the Kentucky State Fair was held during the week which was designated as Constitutional Week, and we had a very intense and very effective celebration of the Constitution in Louisville during that week.

EFFECTIVE MEANS OF ADVERTISING SAFETY

Instead of getting out an advertisement leaflet and distributing it as we usually do, we had printed 100,000 copies of the Constitution of the United States and we distributed 96,000 of them. At least 50,000 copies of the Constitution were read and I leave it to you to judge how large a proportion of those 50,000 were read by people who had never read that document as a unit before.

With those copies which were distributed, a little button was passed out which had the safety cross on it and the legend: "Safety Saves Suffering." There was nothing on that button to indicate where it came from, except a little insert on the back, "With the Compliments of the Louisville Railway Company." There was nothing on the face of the button that could be construed as an advertisement.

Another thing: at the time of issuing the new automobile licenses last December, and early in January, we had printed 30,000 copies of the pamphlet prepared by the National Safety Council, and put out under the name of the National Safety Council, but for which we paid, and we paid for the clerk at the registration bureau to distribute these pamphlets to every one who came for his license plates in the city and county of Jefferson. On the first page: "There were forty-two people killed by automobile accidents in the streets of Louisville last year." On the title page we had, "Forty-two Graves in a Row. What will we do about it?" Then followed a short, snappy, sensible talk about careful driving in the body of the pamphlet.

I am sorry to say that we have just last week had our forty-fifth automobile death in Louisville, so that we have not stepped in the right

direction in that community, but at the same time it must be borne in mind that Louisville has been rather backward because of the lack of good roads in Kentucky, in developing the automobile traffic, and we have now registered 36,000 cars where we had only 26,000 last year, so that comparison is perhaps not as bad as it would seem from the figures themselves.

As a matter of identified co-activity, we have a safety council in the company which has representatives from every department, and that council—the Louisville Railway Safety Council—has established at every permanent building owned by the company, some 18 or 20 locations, a full-sized billboard on which posters are displayed, illuminated at night, changed every two weeks. We started with the A. B. C. poster, and carried along and changed frequently enough to attract and hold the interest of the passing motorist.

As an instance of what we are trying to do, last week they filmed "Enemies of Women," in Louisville, and we try to keep our posters up to date. We had the slogan, "Reckless drivers are Enemies of Mankind."

I want to repeat that I think the most essential element of electric railway participation in the safety council activities is not undue, but becoming modesty on the part of the railway company.

SCHOOL CHILDREN AND CAR ACCIDENTS

Dr. E. George Payne (Prof. of Educational Sociology, New York University, New York City): This year, I have seen the educators of the country commit themselves over and over again to the problem of safety education as a fundamental part of our education in all endeavors.

I was asked to address the School Masters' Club in New York City. It consists of 700 superintendents and principals from the New York Industrial area, representing one in every ten children in the United States, and at the close of that address 700 superintendents and principals arose and pledged themselves to undertake safety education as a part of the curriculum in the public schools.

Commissioner Meredith of the State of Connecticut called upon me immediately after that to come down to Connecticut and address the superintendents and principals in behalf of the plan in that state.

My point is just this: the street railways have to run. They have to make time, more to serve the public than anything else. The public is impatient unless the street railways get the people from their homes to their business in the morning. I never go down on the subway, with all its speed, in New York City, without finding someone complaining because it isn't making fast enough time, and yet, in spite of this fact, and the fact that we are wanting to make better time, we are wanting the street railways to serve us better, we want the whole responsibility for accidents, when accidents occur, on the tracks or to the public from the street railway, to rest on the street railway. I mean the public has come to think of the street railway as responsible for the accidents.

One of the most unfair things, it seems to me, is the fact that automobile accidents in which the automobile is in 99 cases out of a hundred

cases is responsible for the accident in collision with the street railway, because the railway has the right of way, the law recognizes and classifies the accident as a street railway accident instead of an automobile accident.

My point is this: you have an opportunity as Mr. Truett says, to change this point of view, by careful study of the whole accident situation, and the street accident situation in the schools, where they can present the whole matter to the children who are now growing up in the right way, and also make it clear to them that if we are to eliminate the accidents it is not by a more effective operation of the street cars, is not by training the men in the operation of the cars, but it is by training the public into the right attitude with reference to the street railways on the streets of the city, and I don't know of any place that that can be done so well as it can in the schools, because there is an agency of the public. The public is being injured, and the only way to reach the street car people is that way. Teach the public that it is responsible.

From my study of the situation I am committed to that point of view, and the only way to solve the problem is to get into the minds of the children and the minds of the parents through the children, the fact that these enormous 20-ton street railway trucks that go down the street cannot be controlled as easily as the conduct of an individual who is walking across the street, or an automobile that is being driven across the street, and we have a right to insist that the public take care of itself with reference to these agencies.

Now the street railway cannot go out and tell the public that in any American city that I know of, directly, but they can by supporting the movement of education in accident prevention in the schools, get that message over. The schools are crying now for material and help in the promotion of education and accident prevention in the schools. They are committed to the movement. Professor Kilpatrick in an address he gave after I talked to a body at which he was present said that he regarded the program of education and accident prevention as one of the greatest contributions to education in the 20th century.

The thing, so far as educational matter, has gone in these five years. is no longer a matter of propaganda, it is a matter of bringing to the teachers, superintendents and principals, materials that they will get help from to do the job adequately. You men can help them, on that program.

SAFETY PRINCIPLES AS APPLIED TO THE INDIVIDUAL UTILITY

D. E. PARSONS, GENERAL MANAGER, EAST ST. LOUIS AND SUBURBAN RAILWAY,
EAST ST. LOUIS, ILL.

A great number of companies are still "doubting Thomases" as to the fact that safety principles can be applied to any size company with favorable results in reduction of accidents and better public relations.

I happened to be a member of the committee on safety work of the American Electric Railway Transportation and Traffic Association during the year 1922. We had several meetings and considerable correspondence among the members of this committee and decided that this matter should be approached from an entirely different angle than it had ever been before. It was agreed that we should endeavor to impress on executives of railways that to operate their property economically they must adopt a sane, practical, systematic and continuous program for safety. Facts and fancies that characterized safety work in the past should be placed in the discard and there remain forever.

From data collected from different railways we found that accident costs on electric railways varied from one-half of one per cent to 17 per cent of their gross revenue, and that the average cost was about four and one-half per cent. Our committee faced a difficult problem, that is, to convince presidents, vice-presidents, general managers, general superintendents and others that:

1. Executive disregard of the waste of preventable accidents is mismanagement.
2. Accidents can be prevented and accident costs reduced by organized effort.
3. Organized effort means practical common sense, systematic plans.

We also found that there were about 1,000 electric railway companies in the country that belonged to the American Electric Railway Association, and out of this number we found only 100 belonging to the National Safety Council.

I have not seen the report of the committee on safety work of the American Electric Railway Association this year, but I will venture to say that they will find conditions among the members of this association carrying on organized safety work to a far greater extent than they ever did before.

HOW SAFETY DEPARTMENT IS ORGANIZED

I am going to relate to you what organized safety has done for us. We believe through organized safety work we have brought about safe working conditions, safe practices and safe operation, all of which make for a safe and efficient workman, a man with confidence in his employer and himself, a man who is working for the best interests of his employer because he knows that his employer is interested in his personal safety and that of his fellow workman. We realize that it is not efficient operation or good management when the debit side of the ledger shows a large percentage paid out in settlements and compensation for personal injury and damage cases among the employees and patrons of our road.

Our safety department is an integral part of our organization. This department is headed by a man of ability with the title of Safety Engineer. This safety engineer's duties include all phases in the prevention of accidents and fires. Our safety committees are composed as follows: Central committee, consisting of the general manager, general superintendent, and a reasonable number of department heads. This central committee

meets regularly once a month and acts upon all suggestions that are offered by the sub-committees. The sub-committees are as follows: Mechanical committee, power committee, gas committee, electrical committee, maintenance of way committee and transportation committee. The personnel of these committees is about 40 members. The sub-committees are selected by workmen in the different departments. The committees not only accept and pass on suggestions for the benefit of safety of their fellow workmen, but also make suggestions which are beneficial to our customers—the traveling public. This committee work is interesting and is eagerly sought after by our employees. They seem to enjoy thoroughly the work as we try to interpose features which keep this work up to the highest pitch of interest at all times.

We are very favorable to the illuminated bulletin boards placed in conspicuous places. These bulletin boards carry bulletins of the National Safety Council and bulletins of interesting world events and are read diligently each day by our employees.

Our safety engineer, in addition to attending meetings of all committees makes a monthly inspection of every nook and corner of the property for accident and fire hazards, and makes, in addition to the committee reports, his own report of his inspection.

I would like to give you some idea as to what has taken place on our property from an insurance standpoint by good housekeeping. Before we made our systematic inspections our annual insurance was \$953,000.00 with an annual premium of \$4,923.00, or a basic rate of 51.7 cents per \$100.00. Today, the total amount of our insurance carried is \$1,862,000.00 and the annual premium is \$5,493.00, with a basic rate of 29.5 cents per \$100.00. This remarkable showing has been accomplished by careful inspection and good housekeeping, and no expenditure of new money was approved that would not pay for itself in premiums in two years' time.

In all of our safety and fire prevention work, as well as our campaigns on unusually clean cars and courteous employees, we did not forget to inform our traveling public in well worded advertisements in the form of car cards and newspaper ads what we were accomplishing for their benefit.

We have come to the stage in the operation of our properties where we believe—and we have so informed our patrons—that we have the cleanest cars, the safest cars and the most courteous employees of any street railway in the United States and we challenge our patrons to tell us of some other public utility that has cleaner cars, safer cars or more courteous employees. Our advertising is not spasmodic but is continual in all cars and in all newspapers in all the cities in which we operate.

USE SLOGANS WITH A "KICK"

With our continual and consistent safety program we endeavor to interpose occasionally some special stunt or propaganda which adds to the interest of our work. For instance, in 1921, we took one of our regular city

cars, painted it several coats of white enamel and painted bulletins on the sides and ends of the car. The following were some of the slogans used:

"White mule as a pep producer is far safer in the gas tank than under your belt."

"The reckless are going to hell so fast you can smell the smoke as the devil steps on the accelerator."

"Hootch will prevent your auto radiator from freezing and also will make wild drivers."

"Do your duty, obey the laws and ask others to do likewise."

"Reckless drivers make your city unsafe for safe drivers."

This car attracted considerable national attention and pictures of the car were printed in newspapers all over the country. Such a car has been used in other cities to good advantage since that time.

We are continually thinking of something unusual in our safety work. We recently installed on two interurban cars klaxon, air-operated horns. Experiment has proven that such a horn warns the driver of the noisiest Ford or truck of the approach of the car and meets the approval of all the communities in which we operate. We believe that this klaxon air-operated horn is much more satisfactory than the standard air whistle on the average interurban car.

We have decided to change the wording on the picture on our 300-foot highway crossing signs every two years so as to make them so attractive that they will not be overlooked by any automobile driver.

We have been able to partially convince the Illinois Commerce Commission that about 50 per cent of our crossings are extra-hazardous instead of about ten per cent and the commission has ordered "stop" signs installed. According to Illinois law automobile drivers must stop before crossing, where these signs are placed.

At the suggestion of our local automobile clubs recently adopted a special lens on interurban headlights that somewhat obviate the glare and, at the same time, gives the same illumination as the original clear glass lens. This has met the approval of the automobile drivers.

We recently adopted a rule on our interurban lines where hard roads cross the right-of-way that motormen must approach and pass over such crossings at such speed that collisions would be improbable. This is in addition to our regular rule that motormen must sound whistle or ring bell vigorously on approaching such road crossings. We believe that this rule has very materially reduced our highway crossing accidents.

I do not want to burden you with a lot of statistics but will give a few to show what benefit organized safety has been to our properties. There has been a continual decrease in the number of accidents to employees from year to year. During the year ending July, 1922, 41 were injured and during the same period ending July, 1923, 35 employees were injured. Many of these injuries were as slight as cuts of fingers. This record was made in spite of the fact that there has been a 16 per cent increase in the number of employees. It should be appreciated also that our

safety committee personnel being made up of employees elected by their fellow workmen raises the morale and efficiency of employees; in other words, they have and take a direct interest in what we should do to further safety, fire prevention and general efficiency on the properties. On the East St. Louis Railway, 2.29 per cent of the gross passenger revenue is our record for the year 1922; for the East St. Louis and Suburban Railway suburban and interurban lines it is 4.85 per cent. Automobile collisions with interurban cars in 1921 were 171; in 1922, 149. On the East St. Louis Railway, which is strictly a city line, in 1921, the automobile collisions were 218 and in 1922, 270. A careful analysis of the automobile and car collision records show there has been a decrease each year in the number of collisions where our cars were moving at the time of the collision but there has been an increase in the number of collisions where automobiles collided with our cars that were standing still.

CLAIM DECREASE REDUCED 50 PER CENT IN FIVE YEARS

I might give you a record which will make the cold-blooded manager sit up and take notice as to what organized safety work will do. The following is the record of the East St. Louis Railway Company:

- 1918 injuries and damages 4.04 per cent of the gross passenger revenue.
- 1919 injuries and damages 3.63 per cent of the gross passenger revenue.
- 1920 injuries and damages 3.31 per cent of the gross passenger revenue.
- 1921 injuries and damages 2.75 per cent of the gross passenger revenue.
- 1922 injuries and damages 2.29 per cent of the gross passenger revenue.

The trouble with the average manager of a public utility who is not thoroughly in accord with spending even one per cent of his gross income for safety work is that he allows the operating department to start a safety program and if they do not show a decrease in money expended for injuries and damages the first or second year he becomes skeptical and is not in thorough accord with the movement. It will take more than two years on most properties that have not had thoroughly organized safety work to make a very material saving in dollars and cents. The management of nearly every public utility property have a hobby of some kind which is pleasing to its patrons or customers and I do not know of any hobby that an up-to-date manager could adopt with less expense for the benefit of the public than well organized safety; it has proven that it is conducive to good business.

Competition in the electric railway business, especially interurban business, is such today that it behooves the management to be thinking at all times of new ideas to sell its service. New ideas along accident prevention can be inaugurated which cannot help but be beneficial. Whenever a railway company is known in its own community to be a conscientious advocate of safety principles it promotes good public relation. If your safety engineer is known as an expert and his company practices more than it preaches, he will be of great assistance in promulgating safety ideas for the good of the entire community and be an asset to his own

company. There has never been a discussion among our board of directors as to how much money was being spent in accident and fire prevention work, as the results we have obtained have been very gratifying.

I again appeal to every manager of a street railway company to adopt a practical systematic and continuous program for safety and for closer co-operation with the National Safety Council, which will help you solve your problem of collisions with automobiles, which today is probably the greatest hazard confronting the street railway management. I might say in conclusion that about 50 per cent of our total accidents today are street car-auto collisions.

DISCUSSION

Mr. A. J. Van Brunt: I move that our incoming executive, when he attends the meeting of the Claim Agents & Transportation meeting in Atlantic City next week, be requested to use every means in his power to get the executive officials of the railways throughout the United States to join the National Safety Council in general, and particularly this section.

The motion was seconded and carried.

Chairman Truett: Mr. Van Brunt is the first to discuss this paper.

Mr. H. K. Bennett (United Electric Railways Company, Providence, R. I.): The plan which I put into effect on the lines of this Company, involving approximately six hundred and fifty cars, was to post in each end of the car, on the side window, once a month a small sized poster, procured from the National Safety Council. This was started in April and continued through May, June and July, approximately six thousand posters being used during that period and in addition to these a series of the small posters, containing pictured hints to the motormen and conductors, members of the line department and workmen in the repair shops, were used on the bulletin boards at the various Company headquarters.

The car posters "took," as the expression goes, from the start, and favorable comments were heard on all sides. The second day that they were in the cars, the Police Department of Providence made a personal request for a set of them and as time went on, more favorable comment was heard. The actual effect of these posters as to the reduction of pedestrian accidents in particular was not shown until July when our records for the months of July and August showed a satisfactory reduction in this class of accidents over the corresponding period in 1922, and, in July, 1923, the gross number of accidents was reduced for the first time since the year previous, and while many of the safety ideas were put into effect and other preventative measures taken, yet I believe that the car advertising played an important part. We suspended this service during August and September but it is my intention to renew publicity along this line commencing in October.

In conclusion, I can simply say that I am perfectly satisfied that the National Safety Council is doing all that it can to bring home to the car riders and the workers in the various trades, through these posters, a lesson which cannot help but be a deterrent to accidents. Of course, I

know that National Safety Council posters are not designed for such use but I know also that if any number of electric railways wish them the Council will be glad to furnish them.

Mr. A. W. Koehler (Director of Safety, New York State Railways, Rochester, N. Y.): The attitude of the managing head of a given property is the most vital factor in the conduct of a safety organization on any property. The most ardent safety worker will lose heart and his efforts will be discounted to a large degree if he does not have the whole hearted backing of the head of the company. This backing must be more than a mere acquiescence in the general scheme adopted. Just a statement to the effect that he is interested, on the part of a president, vice president or general manager is not enough. He must make it unmistakable that his interest is more than a passing one.

Mr. Parsons illustrates this when he says that the trouble with the average manager of a public utility who is not thoroughly in accord with spending even one per cent of his gross revenues for safety work is that he allows the operating department to begin a Safety program and, if they do not show a decrease in money expended for injuries and damages the first or second year, he becomes skeptical and is not in thorough accord with the movement. He is quite right in saying that it may take more than two years to effect a material saving.

PLEADS FOR CONCENTRATED MEMBERSHIP CAMPAIGN

A machine may be as nearly mechanically perfect as is possible to make it, yet it will do no useful work if power is not supplied from without. A generator that is not connected to some form of prime mover will not generate a single kilowatt. Neither can a safety organization that does not have available sufficient funds or authority to carry on its work deliver much in the way of useful accomplishment. The character of the safety organization determines the degree of success that will attend its efforts.

Spasmodic effort or ill advised propaganda is worse than useless. It is simply a target for ridicule and when it is eventually discarded as it must be, there will be many who'll say "I told you so." While on a large property it is essential that accident prevention measures be supervised by some responsible person, yet it is necessary that every department and every individual take an active part. A sane, practical systematic program is one that gives a part to every member of the organization.

Mr. Parsons has outlined the manner in which the safety department in his company functions. The statistics which he presented speak for themselves. The reduction of insurance premiums from a basic rate of 51.7c per \$100.00 to 29.5c per \$100.00 of payroll, is an accomplishment of which his company may well be proud.

There is no reason why other companies may not achieve worthwhile results and effect savings that are well worth striving for. The momentary value represented in a lower annual number of accidents is not the only compensation for organized safety. As pointed out by Mr. Parsons the safety work of a public utility company is splendid public relations material, in addition also to being a means of improving morale inside the organization.

In these days of large companies and corporations the old time close relation between employee and employer has been all but lost. Through the medium of safety committee meetings and informal gatherings where safety is discussed with executives present there is fostered a spirit of friendliness and helpfulness that is a tremendous asset to any public utility company.

As a concluding thought, let it be said then that organized safety has a place in every public utility because it is economically sound and equitable, because it engenders good will and fosters a feeling of confidence in the management and because it promotes better public relations in the community in which the company operates.

Mr. A. J. Van Brunt: Frequently I am asked to suggest some new methods in Safety Educational Work. Almost everything has been tried, almost everything tried has been of some benefit and I consider it undesirable to waste time looking for new methods. Some will be found and tried, that is wise: but in the mean time, to produce results we must go over the same ground again and again and if we do we will produce the desired results. In that respect I ask permission to read some verses which express my thought.

THE LITTLE BLACK HEN

Said the little red rooster: "Gosh all hemlock, things are tough,
Seems that worms are getting scarcer and I cannot find enough.
What's become of all the fat ones is a mystery to me;
There were thousands through that rainy spell, but now where can they be."

The old black hen who heard him didn't grumble or complain,
She had gone through lots of dry spells, she had lived through floods of rain;
So she flew upon the grindstone, and she gave her claws a whet,
As she said: "I've never seen the time there weren't worms to get."

She picked a new and undug spot; the earth was hard and firm;
The little rooster jeered, new ground! that's no place for a worm.
The old black hen just spread her feet, she dug both fast and free,
I must go to the worms, she said; the worms won't come to me.

The rooster vainly spent his day through habit, by the ways
Where fat round worms had passed in squads back in the rainy days.
When nightfall found him supperless, he growled in accents rough;
"I'm hungry as a fowl can be. Conditions sure are tough."

He turned then to the old black hen and said: "It's worse with you.
For you're not only hungry, but you must be tired too,
I rested while I watched for worms, so I feel fairly perk;
But how are you? Without worms, too? And after all that work!"

The old black hen hopped to her perch, dropped her eyes to sleep,
And murmured in a drowsy tone, "Young man hear this and weep:
I'm full of worms and happy, for I've dined both long and well,
The worms are there as always—but I had to dig like —!"

And we have got to dig just like that to produce the results we are striving for.

Mr. G. T. Helmuth: We all recognize discipline as a necessary corrective in maintaining proper train operation. Discipline is the negative method; reward is the positive. We must have the former, but I believe that we can all very well afford to avail ourselves of the latter.

ADJOURNMENT.

Employees' Benefit Associations

October 5, 1923

LEO. D. WOEDTKE, Chairman

Fred T. Ley & Company, Inc., Springfield, Mass.

FRIDAY MORNING SESSION

CHAIRMAN WOEDTKE: This meeting is really not in the nature of a permanent section. There has been a great deal of interest, over a period of several years, among the men and women attending the National Safety Congresses in the matter of employees' mutual benefit associations.

There are some 674 employees' benefit associations of which we have record in the country that are affiliated with the National Safety Council, and it is for their benefit that we have attempted to work out this program.

THE EFFECT OF PHYSICAL EXAMINATION ON THE HEALTH AND WELFARE OF EMPLOYEES

**LOUIS I. DUBLIN, STATISTICIAN, METROPOLITAN LIFE INSURANCE COMPANY,
NEW YORK CITY**

We, in the Metropolitan Life Insurance Company have long realized the benefits which physical examinations bring to everyone concerned. We employ about 8,000 men and women in the home office and 17,000 in the field. The spirit animating these 25,000 persons is like that prevailing in a large and intimate family; the officers are deeply interested in the well-being of every member of the staff. With such an aggregation, it has been a common experience to see large numbers of women fall by the wayside as the result of health and physical impairments. Some even die long before their natural time from an insidious disease which might easily have been prevented, had the proper treatment been instituted at an early stage of its development. We have suffered like all other business organizations, from disrupted work in the home office and poor production in the field, because some individual in a position of responsibility, upon whom a whole group of people depended for direction, suddenly became ill and incapacitated, whereas his usefulness could have been prolonged over a long period of years if he had only known how to take care of his health.

We, therefore instituted, a good many years ago, a system of physical examinations for our employees, virtually requiring everyone in the Company's service to be examined annually, either by our staff physicians or their own family doctors. Our purpose was to have each individual discover exactly what his physical condition was; what impairments he had, if any, and what steps he ought to take to cure his condition. The records of these examinations have been studied from year to year. We have taken note of the impairments found and of the type of troubles which developed. We have tried to trace the causes of some of them and have addressed ourselves as an organization, specifically to the care of the individuals who show physical weaknesses of any kind. For those suffering from tuberculosis, either advanced, incipient or threatened, we have established what is probably one of the best sanitoriums in the world; an institution which has a remarkable record for sending back to the service of the company a large number of cured patients. There are, in the home office today, 300 workers who have benefited from the care given at Mt. McGregor and are now performing useful work in the community, instead of filling premature graves. Gradually the activities of the sanitorium have been extended; and it now cares for those suffering from complaints other than tuberculosis. Today, there are more persons in the general than in the tuberculous wards.

In the home office, the medical division is constantly in touch with those whose physical examinations disclosed conditions of anemia, malnutrition, overweight, or other impairments. Every year has seen some new development in our work. We have cut down the cases of overweight; we have helped to cure diseases of the kidneys; we have improved defective eyesight through the prescription of proper glasses and fitting them correctly. Dental hygiene has been instituted and each employee has the benefit of prophylactic dental work every six months. In addition to being cleaned, teeth are examined and dental treatment recommended. All workers with defective teeth are urged to have the necessary corrections made by their personal dentists.

PHYSICAL EXAMINATIONS ARE PROFITABLE

Naturally, this medical service has cost the company a considerable sum, as not one penny has been contributed by the employees. But if these expenditures have been made, it was because we believed in their value and were completely satisfied with the results obtained. We have repeatedly noticed a striking improvement in the health of individuals who would otherwise have gone down hill. This work has been an important factor also in promoting better industrial relations. Our medical department has supplied us with healthy and efficient workers who have increased production as a result of the care given. On the other hand, our employees appreciate the fact that the medical department increases their efficiency and consequently their earning capacity; it helps them to keep fit and prolongs their working life. Nowhere, to our knowledge, is

there a better satisfied or more loyal group of employees. Every worker feels as though he owns a personal stake in the welfare of the company and so contributes his best energy to its service.

But even more profitable than the medical work which the company has done for its own employees, is its experience in providing for the physical examination of large groups of its policyholders. As you know, an insurance company is in business to pay claims when policy holders die. Preventing or postponing the deaths of policyholders results in large monetary gains to the company and fully justifies any expenditure involved. As part of a definite attempt to extend life, the company made a contract in 1914 with the Life Extension Institute whereby it was to examine, free of charge to them, all ordinary policyholders who carried a certain amount of insurance. Many of our policyholders immediately availed themselves of this offer and gladly took the examination and other health services offered by the institute. Each year the number of those so served has grown, and during 1923 the company will have paid for the examination of 60,000 policyholders. A total of over 200,000 individuals will have been examined since the offer was made a few years ago. We have extended this service and are now covering even those who hold only \$500 worth of insurance. But let me emphasize again that we are a business organization and cannot be moved by sentiment. The monies we spend must be strictly accounted for; the funds are not ours and if we make an expenditure for health purposes, it must be solely because it is profitable to do so. We soon found, though, that money spent for the physical examination of our policyholders was a very profitable investment.

To determine the exact return on our outlay, the records of about 6,000 people were carefully analyzed and their progress followed during a period of five years. Included in this group were all the people examined during the first two years—1914 and 1915. Their mortality was compared with the standard mortality tables which fit the class. The results of this study were so astounding as to be almost incredible of belief. According to the standard table used, there should have been 303 deaths; whereas actually only 217 of those examined had died. Eighty six lives had been saved. In other words, the mortality had been only 72 percent of what was expected. This result was so spectacular, that only after a careful check was instituted were we thoroughly convinced of its accuracy. The greatest saving (amounting to 53 percent) was found in the age group between 50 and 60 years. This is especially noteworthy since the mortality from the degenerative diseases is so heavy at present, and this would be the class ordinarily most seriously disrupted from that cause.

Another interesting finding of this study was that the greatest gains had been made by the group who were suffering from serious impairments. It included persons with high blood pressure, heart disease, lung troubles and other grave organic diseases. These 1,400 individuals were so

much impaired that they would probably have been rejected for most forms of insurance. And yet they gave a mortality experience at the end of over five years of about half of that expected!

PATIENTS ADVISED AS TO TREATMENT

What is the secret of this apparent miracle? It is simple enough. The remarkably favorable showing which this impaired group made, probably resulted from the profit derived from the examinations which taught them the truth about their physical condition and how to take proper care of themselves. Many found for the first time that they had impaired kidneys; others that they had heart murmurs; still others, that they suffered from incipient tuberculosis. Another group discovered that their weight was far above normal and that it was necessary for them to reduce in order to keep fit. These people were not only examined but they were advised as to what hygienic measures, what medical treatment, what change in their mode of life was called for in each individual case. We have good reason to believe that, on the whole, they took this advice very seriously. The records showed that many were following the advice given and had improved in health considerably as a result. A large proportion came back for subsequent examination every year—a positive proof that they appreciated the benefits derived. Many of the overweights were making definite and successful efforts to reduce and were modifying errors of diet and other habits injurious to their health. Those who had impaired kidneys in many instances showed urine specimens free from all traces of albumin. Those with heart murmurs were taking precautions and were not exerting themselves unnecessarily.

Turning now to the financial side of the experiment, we found that in dollars and cents also the investment had paid extremely well. After deducting the cost of examinations made by the institute, we calculated that we had saved \$2.00 for every \$1.00 expended in this attempt to reduce death and prolong life. That is why we liberalized our policy, increasing the number of policyholders to whom we offered physical examinations and giving them at shorter intervals of time.

PHYSICAL EXAMINATIONS AS PHASE OF NEW PUBLIC HEALTH MOVEMENT

I am firmly convinced that physical examinations properly given and followed up save life and that the practice is a new phase of the public health movement which is bound to grow. Though we have made marked progress in cutting down mortality from tuberculosis, typhoid and other communicable diseases (which have been reduced 50 per cent in the last decade) we have not yet been able to combat successfully those diseases due to faulty habits of living. The mortality of the older age groups has remained stationary. Thus the great gains of the future must come through the development of better personal hygiene and a reduction of the degenerative diseases which follow neglect of the body.

If, then, periodic health examinations reduce the amount of sickness and cut down the death rate, it is obviously to the interest of the Mutual

Benefit Associations to utilize this means of keeping workers healthy and efficient. You occupy a strategic position and better than any other organization, can improve the health of the industrial workers of the country. Your associations are democratic in their nature. Your membership comprises the operating personnel of our factories and industrial establishments. By providing the kind of health service outlined above in addition to your usual practice of furnishing health and life insurance, you are performing constructive community work. Moreover, our experience will be your experience. You, too, will find that by improving the health of your group, you decrease in the same proportion, the amount consumed in paying death and sickness benefits. Thus at the same time you are benefiting the worker in securing for him a higher standard of living, you are likewise serving your own ends. As a group you are vitally interested in the health of the individual, especially since your treasury immediately reflects the savings which accrue from reduced sickness. In that report your position is exactly like that of any other insurance organization. To be effective you must remain solvent and that can best be done by reducing your operating costs to a minimum. You will prosper to the extent that you meet your obligations promptly and are able to extend your benefits. Your structure, likewise, must be reared on a foundation of accurate, actuarial computations, so that there will be no question concerning the adequacy of premiums and the guarantee of benefits. There can be no better way to cut down expenses than to insist upon the physical examination of your membership; to follow it up properly and help those who need financial assistance to carry out the recommendations of the doctor. Every case of illness which you prevent, every death you postpone adds to your funds and takes that much less from the pockets of the members who pay dues. You can use the same means which the Metropolitan has found so successful in reducing the number of the chronic sick, the invalids and those cut off by premature death. The health examination will assuredly pay you dividends: the benefits so derived by each individual in your group will rebound to your mutual advantage.

DISCUSSION

Mr. Ashe (General Electric Co.): There is one point that the speaker brought out that is somewhat different from that in which a number of mutual benefit associations function. That is this matter of the physical examination of the employee after he becomes a member. I do not know whether the idea was in this particular case as it is with some companies, that of requiring physical examination before the employee becomes a member or can join the mutual benefit association.

Chairman Woedtke: If you will pardon me, I think you missed a point that I remember very well in listening to the paper, that in speaking of the 25,000 employees of his company as employees in the Mutual Benefit Association, this examination is not only of a confidential nature between the examiner and the association member or employee, but the eligibility

of membership in the association was not dependent upon the examination, but the examination was rather a service feature given to the employee. I didn't want you to confuse that with compulsory examinations to become eligible.

Your experience with the General Electric Company, if I get you correctly, makes you recommend heartily the advisability of a physical examination and that service in connection with the Mutual Benefit Association. Is that the point?

Mr. Ashe: No. The point is I am in favor of the physical examination when you hire a person, but after a person becomes part of your establishment if you want to give them periodic voluntary examinations for their benefit it is a splendid thing, but I don't think you ought to require a physical examination to decide whether a person should join your association. I think you should get everybody in that you possibly can get in.

Mr. Winans (Union Carbide & Carbon Co.): Assuming you do not have preliminary examinations for employment, do you not think it is essential to require a physical examination for entrance into the benefit association?

Mr. Ashe: No, I shouldn't do it if I had the option. As I say, in that case I would put in physical examination for new employees and then after the employees came in I would make it optional in the matter of the mutual benefit association.

Mr. H. S. Lee (A. E. Nettleton Co., Syracuse): We have no physical examination at all, either at the time the employee joins the Nettleton organization or at the time he joins the benefit association. We have been running our association since 1907 and have experienced no difficulty that we can notice and do not require a medical examination.

Mr. E. F. Washburn (Bridgeport Brass Co.): I would like to ask for an expression by the raising of hands as to the number of associations who do not require a physical examination and the number who do, just as a general consensus of opinion.

Chairman Woedtke: It is about three to one in favor.

Mr. Frank E. Chapman (International Harvester Company): Our benefit association at the present time runs about 25,000 members. Our maximum death benefit is \$4,000, our maximum disability benefit is a half wage on the basis of not to exceed a salary of \$2,000 per annum for a period of fifty-two weeks, so you see we are going some. A physical examination for membership is absolutely essential.

Chairman Woedtke: What about thereafter?

INTERNATIONAL HARVESTER COMPANY METHOD

Mr. Chapman: Thereafter we do not require it, but the International Harvester Company medical staff makes physical examinations when called upon. For instance, we have a foreman, we will say, who isn't feeling right; he goes to the doctor's office and has an examination for

high blood pressure, urinalysis, etc. We tell the man what is the trouble. We have just spent nearly \$30,000 for equipment for laboratory purposes in the plant at Chicago. That is open to everybody in the Harvester Company from the president down to the office boy or the poor Italian who can't speak English and works out in the foundry. We have had some grand results already and have had it in operation just about two months.

Mr. Harold Ley (Fred T. Ley & Co., Springfield, Mass.): Don't you think you ought to make clear between the different examinations? I think you have two entirely different problems between the employees who are looking for a job and the examination of the employees who are members of the mutual benefit association. One is entirely for the interest of the employer and the other for the employee.

Mr. Price: I think perhaps we are all interested in a physical examination for the good it will do. I would like to put this question and see if we can get any help. I am in a town of 40,000. We have keen competition in labor. We have never had a physical examination for entrance as an employee or into the mutual aid. How do you proceed to educate folks to take a physical examination? Is there any resentment about a physical examination? How do you get by with it in a small town of that size? I imagine in a city it is different. We don't know how to put it across in a small town where it has never been.

Mr. Ashe: I think we have our difficulties the same as any other concern, but, of course, it is a New England community and it is probably more stable than some others, but we have had very little trouble with that; if anything, we have had less trouble. It may be that we got started early and may have had some benefit out of that. It seems to be a natural thing that has grown up.

Mr. H. W. Baldwin (American Car & Foundry, Buffalo): Physical examinations seem to have absolutely no value to anybody anywhere unless the result of those examinations is closely followed. If a physical examination is made and certain things are recommended, will they do it of their own accord? Suppose treatment is required, will the patient pay for the treatment himself or will he just say, like a great many of us do when the doctor tells us to stop smoking, that we don't think it amounts to so much. Does the insurance company that says for every dollar expended they save two dollars give any free medical attention? How do they get the patient to take the medical advice?

Mr. Ley: I know something about this examination in the Metropolitan. There is a little confusion there. The two dollars that they speak of saving is the money they saved on their policyholders and not on the benefit society. They are two entirely different problems. The Metropolitan is examining all of its employees, but it has also offered the service of the institute to its policyholders all over the country, and the two dollars saving is on their policyholders. Those were people scattered all over the country who probably knew nothing at all about the examination, but the policyholders themselves went to work and did the things recommended to them and the result was the saving in money

Mr. H. W. Forster: It has been the privilege of my organization to get a fairly close up, perhaps practical view of the benefit association problems. We will assume you want a benefit association. The next question that comes up is this: shall membership be optional or compulsory? If it is compulsory it is perfectly obvious that no medical examination as an entrance requirement is possible, because they have all got to come in.

We will assume that you are going to have a voluntary association. Immediately you are confronted with the question of whether you will have a physical examination before a person can join that association. I am against it for two fundamental reasons. First, benefit association exists for the purpose of rendering service, and the person for whom it renders the service is the one who suffers disability, and the man who suffers disability is likely to be weeded out by the preliminary examination for membership in the association.

Now the question comes up once a year, are we going to have an optional or compulsory examination? You have to impress upon them that in following up medical examinations you are rendering a social service to the man far greater than to yourself, because his health is more important to him than the fact that the association has to pay out some money. You have to put 95 per cent of the emphasis upon the fact that he is a member of the association in good standing, sick or well, as long as he is a part of the plant, but for his own advantage we think it is desirable to have such an examination. If the association, as an association, will vote by an overwhelming percentage in favor of compulsory examination, have it, but if they won't, and they probably won't, you can't get it.

Mr. Lee (Nettleton Shoe Co.): We have the plan and will be glad to send it to any one.

ADMINISTRATION METHODS AND COSTS

W. A. BOOTH, WILSON FOUNDRY AND MACHINE COMPANY, PONTIAC, MICH.

The affairs of the Pontiac Employees Mutual Benefit Association are administered by a board of directors consisting of 14 men. Each member of this directorate represents a factory located in the City of Pontiac. Each factory is entitled to one director regardless of its size. The smallest concern in this group is a paint factory that employs about 10 men and the largest is a concern manufacturing Willys-Knight and Overland engines and employing 3,500 men and women. There are also three subsidiaries of the General Motors Corporation in the group. Each director is elected by the employees in their respective factories and serve for two years. The director in the larger factories may have his assistants to help him but the factory has only one vote. The directorate meets as a whole once a month and serves without pay. There are four principal committees, Executive, Claims, Finance and Investment, that act with and for the managing secretary. The claims committee meets once a week to decide all disputed claims; the other committees meet on call. The treasurer

receives a remuneration of \$75.00 per year and is the only paid officer.

The managing secretary is a hired employee and at present is drawing \$3,000 per year. The association offices occupy 3 rooms in a down town bank building and employ 6 people, including the secretary.

MEMBERSHIP AND OPERATION

The present membership is about 8,700 men and women who are accepted at time of employment without physical examination or age limitations. They are divided into A, B and C classes, with dues and benefits that vary with the average weekly earning. The minimum dues are 20 cents per week paying \$1.00 per day accident and sick benefits. The maximum dues are 30 cents per week paying \$2.50 per day accident and sick benefits. The funeral benefit of \$150 and the death or total disability benefit of \$500 is the same to all classes. When the association was first formed we paid a death benefit of \$175.00. After two years of operation we accumulated about \$50,000 in surplus. In the meantime, the directorate was groping about for a means of returning some of the earnings to the individual member without paying a cash dividend. The final result was the purchase of a \$500 life insurance policy on each and every member of ninety day standing. This without any increase in dues or other drastic change in the constitution. This was accomplished by the purchase of a term policy on the group plan at a low rate. We had considerable difficulty in placing this business but finally accomplished it to our satisfaction. It has not been a direct money maker for the company who carries it but they are satisfied with its indirect benefits. We then dropped the original death benefit of \$175 but have recently taken it up again as a funeral benefit of \$150 payable to the beneficiary of any deceased member of less than 90 days standing. Our entire membership, then, is covered by a death benefit to the extent of about three million dollars.

Membership in the association is virtually compulsory, or that is the intention at least. In the company the writer represents, the insurance feature is a part of the employment contract. The employee signs his application for the life policy at the same time he is signing the ordinary employment routine forms. Our shop boasts a 100 per cent membership of both office and factory and we employ about 3,500 people. The next largest factory in town is very close to 100 per cent. It seems to the writer this feature is a matter of education entirely. It was somewhat difficult at first to enlist every member but now every resident factory employee knows that insurance is an employment condition, while the newcomers are informed of the fact before they start to work.

Dues and interest from investments are the only source of revenue that the association has. The plant owners have never been asked nor have they given any direct financial support. They have, however, given their moral support to the compulsory membership feature. Another item, and a very important one that they have given gratis, is the automatic collection of premiums due, through their respective pay roll departments. Practically every employee in the various plants in the city has a deduction from his or her pay, covering a week or two weeks premium in ad-

vance, which is paid to the association in a lump sum. This of course does away with all cost of collection of dues as far as the association is concerned and insures a known steady income based on the number of employees at work. Our directorate appreciates that this alone is one of the main causes for the success of the association.

COSTS INCOME DATA

The fiscal year of the association ends the last day of February. The following figures are for the twelve month period ending February 28, 1923, and show, in detail, where the dollar goes. Approximately 74 per cent of every dollar is returned in benefits.

Expenditures		Per cent
Dues returned	\$ 214.14	0.25
Benefits paid. Direct and Indirect		
Detroit Life Ins. Co.—Indirect—18.....	565.22	21.79
Sickness—Direct—22	465.63	26.38
Accident—Direct—21	115.79	24.80
Postage	123.48	0.14
Advertising	15.36	0.02
Sundries	584.97	0.69
Office Supplies	591.06	0.69
Salaries	9,558.38	11.32
Printing	318.92	0.37
Maintenance of Auto	468.26	0.54
Travel and Entertainment	206.63	0.34
Charity	550.47	0.65
Subscription and Dues	39.00	0.05
Rent	1,485.00	1.61
Medical	126.00	0.15
Telephone and Telegraph	152.28	0.18
Legal and Professional Service.....	1,165.00	1.37
Visiting Nurses Association	30.00	0.03
Depreciation, on old auto, new auto, build- ings, furniture and fixtures, including loss on sale of old auto and furniture.....	2,229.88	2.59
Net Gain for Fiscal Year.....	5,145.68	6.04
Total	\$85,151.15	100.00

The item of \$1,165 for legal and professional services is an unusual expenditure for the association, being in the nature of a retaining fee to a well known firm of certified accountants to prepare and present our side of the argument as to why the association should not pay an income tax to the government. The item of \$30 is but the initial payment to a local visiting nurse association for visits to our members and their families in cases of sickness and accident. The rate is 50 cent for each visit and this service is absolutely free to our members. This is a new feature and will be greatly expanded in the coming years. These nurses work under

the direction of the regular physicians, and we look forward to the day when their activities will be largely taken up with prevention of sickness rather than the curing of it.

Comparison of dues paid by the employees of the various factories with the benefits paid back, both direct and indirect, follows:

Paid in.	Factory.	Indirect Benefit or Premium on the \$500 policy.	Direct Benefit Sick and Accident.	Total.
\$ 1,101	American Forge.....	\$ 198	\$ 1,037	\$ 1,135
6,980	Beaudette	2,136	4,015	6,341
214	Consumers Power	87	260	347
164	Daily Press	77	11	88
63	Weatherproof Body Corp.....		112	112
67	Jiggs Bushing Co.....	5		5
185	Eames & Brown.....	47	14	61
6,054	General Motors Corp.....	1,472	1,950	3,422
1,357	Hess-Pontiac	445	504	949
246	Hubbard Spring Co.....	133	164	197
27,626	Michigan Drop Forge Co....	287	1,825	2,112
27,626	Oakland Motor Car Co.....	5,405	11,795	17,200
283	Slater Const. Co.....	159	622	781
74	Pontiac Paint Co.	28		28
33,452	Wilson Foundry & Mch. Co..	5,470	19,129	24,599
2,758	Members who pay their dues at the association office..	1,424	2,138	3,562

General Statistics for the fiscal year ending Feb. 28, 1923:

The average monthly membership was	6,105
The average monthly receipts from dues.....	\$ 6,856.00
The average monthly amount received from each mem- ber	1.123
The average monthly premium paid for each policy holder to the Detroit Life Insurance Co. on the \$500 Policy	.503
The average monthly amount paid for sick and acci- dent claims	3,632.00
The average monthly amount paid to Detroit Life In- surance Co.	1,547.00
The average number of Policy Holders.....	3,076
The average monthly membership was.....	6,105
The total sick claims paid for all factories—	
Male	670
Female	48
	— 718
Benefits paid for these claims.....	22,465.00
Time lost account of above claims.....	11,412 days
Average amount paid for a sick claim.....	31.28

Average duration of a sick claim.....	15.9 days	
Average amount paid per day.....	1.97	
The total accident claims paid for all factories—		
Male	581	
Female	22	
	—	603
Benefits paid for these accident claims.....		21,115.00
Time lost account above claims.....	9,219 days	
Average amount paid for an accident claim.....		35.00
Average duration of an accident claim.....	15.3 days	
Average amount paid per day.....		2.29

We have on record the nature of all sick claims, also the detail of the accidents, showing exact number of days paid for, what factory, etc., and these are all compiled in monthly reports for each factory and as a whole. If called for, reports will be sent to anyone interested.

We believe we have as near a 100 per cent mutual association as it is possible to have. We do not run it strictly on a hard and fast rule basis. The directorate treats specially needy cases with common sense and generosity, very often overlooking the rules and trying to apply the Golden Rule.

We are convinced that compulsory membership is not only practical but necessary. It is a known fact that 90 per cent of our membership have no other life insurance than that which we supply.

However, this condition is gradually bettering itself. As the members become used to the value of insurance they are taking more out on their own responsibility, so that the association is serving two purposes. It is a practical help in time of need, and a means toward the education of the employee to the value of insurance or savings.

DISCUSSION

Chairman Woedtke: We have been organized for a good many years and we work on this basis. It is a voluntary matter whether they come in or not; it is optional. We have both men and women. The by-laws that they operate under they made themselves. They elect their own executive committee, who, in turn, elect their own officers. The company has no standing or no control, no domination at all; they leave it to the employees. They took a chance and let them run it.

We give them from one to five thousand dollars mutual life insurance, according to the length of service, running from six months minimum to fifteen years maximum, and they stop at five thousand. We give them a twenty-dollar-a-week sick and disability benefit, except in the case of workmen's compensation where they can't draw two.

We also give an annual strictly confidential forty-five-minute physical examination. The cost is borne fifty-fifty by the company and the employees.

Mr. Price: What is your cost per man?

Chairman Woedtke: A five-thousand-dollar-a-year man costs \$36.00 a year. The company pays about equal. Of course, keep in mind that this is a pretty healthy plant.

Mr. G. F. Close (Commonwealth Steel Co., Granite City): I think there is a serious question involved in this from the matter of cost. It seems to me that if it can be worked so that you could have the yearly physical examination and follow it up, you would get in right with the insurance company certainly, but you would get in wrong with the men. Of course, we want to look at this thing from the point of view of helping everybody that is down and out, but are the insurance companies going to come to us next year or the year after with figures so high that our men will say they can't afford to go in? It seems to me that is a problem which we are all facing. The rates are increasing; they were increased last year, I think, pretty generally.

Mr. Forster: In group life insurance you can buy a contract that gives an increase of rates over a period of five years. In individual life insurance, of course, you buy a level premium and are protected for life. The group disability insurance game is so new that no company has yet, as far as I know, been willing to guarantee a rate for a given group for more than a year and they have been very wise in not doing that. The insurance company guarantees you any one policy year against any more expense than at the beginning. You can't, in the long run, expect a life insurance company with an overhead of twenty or twenty-five per cent to pay you for its losses.

Mr. Elwell: Along the line of some special benefits for the man who is unfortunate, we have two forms of finances in our association. One is the regular dues for benefits, and those funds are kept entirely separate. We have another fund growing right along from which we derive the profits of the relief association store. Those finances are used to help out fellows who are out of luck, whether they are members of the association or not so long as they are members of the company. Any person who is an employee of the company can get a little bit of help, and sometimes it runs up quite a little, in case of sickness, out of that particular fund which we keep up simply running our employees' store.

Chairman Woedtke: This thing is growing apace all the time, and it is tying itself so closely to the many other phases of safety and accident prevention and welfare that we are all working on that it strikes me we could very well begin to operate from now on as a permanent section with officers and committees working out our difficulties and problems.

(Motion made, seconded and carried that a permanent section be formed.)

Chairman Woedtke: The chair will appoint on the nominating committee: Walter Forster, Mr. Ashe and Mr. Robert L. Medlicott.

FRIDAY AFTERNOON SESSION

A PROPOSED ACTUARIAL RECORD FOR EXPERIENCE
STATISTICS OF INDUSTRIAL MUTUAL
BENEFIT ASSOCIATIONS

H. N. DAMBMANN, ACTUARY, MUTUAL RELIEF ASSOCIATION, THE NEW JERSEY
ZINC COMPANY, FRANKLIN, N. J.

The proposed scheme to collect and combine statistics of mutual benefit associations is not a new idea in the general sense of the word. I understand that more than one attempt has been made to obtain this information through outside sources, and as far as I have been able to determine the results have not been successful. The principal difficulty encountered has been the differences existing in the by-laws of associations which have affected the rates of occurrence and severity of illness. I mean by this the different waiting periods and maximum liabilities for length of sickness and for accidents. The combining of statistics with such basic differences has ended in a result that has been unreliable and misleading from an actuarial standpoint. I agree that combining all statistics regardless of waiting periods and other differences would result in a meaningless total. However, if the statistics could be classified according not only to these differences, but to different working conditions which might affect the rate of occurrence and severity of illnesses, I think an accurate and valuable total could be arrived at.

I am laying particular stress on sickness statistics for two reasons. The first is that the largest part of benefits paid by the mutual benefit associations falls in the sickness class and the second is that these statistics are the most difficult to get.

Statistics on death rates among industrial workers are comparatively easy to obtain. All deaths are reported and classifications of them have been made according to industries. Rates for non-company accidents among mutual benefit association members should be comparable with non-hazardous accident insurance rates as the rate of occurrence and severity of such accidents could not be effected by the occupation of the insured.

The question rates of occurrence and severity of company accidents is one that does not affect mutual benefit associations to any great extent owing to the fact that a large majority of companies buy their insurance, or if they do not, are self insured and few, if any, associations pay benefits during the time a member is drawing compensation.

In preparing the report and its accompanying questionnaire I have attempted to cover the variable which I think might occur in the by-laws of mutual benefit associations rather than to study the by-laws and eliminate conditions that do not exist. This probably has led to a more complicated form of report than will eventually be necessary.

I can only tell this when I have received the information from the mutual benefit associations who would care to co-operate, should it be decided to keep an actuarial record of experiences.

I have not attempted to touch on the question of finances. There is probably a greater difference between schedules of mutual benefit associations than would be found in any other detail. If it were possible to know the rates of occurrence and severity of the different causes for which benefits were paid it would be a very easy matter to figure back to any rates desired. For example, if it were found that in a certain industry a sickness rate of 400 per 1,000 members occurred and that the severity rate was 8 days per claim, it could be stated that a mutual benefit association starting in that industry and carrying 1,000 members could expect 3,200 days of sickness providing the same waiting period was used as that on which the statistics were based. Should they decide to pay \$2.00 a day benefit for sickness the cost would be \$6,400. To obtain this money a premium of \$6.40 a year would have to be charged to cover these expected sickness benefits. It would work the same way for non-company accidents or deaths.

RELATION OF OCCURRENCE AND SEVERITY RATES TO AGE GROUPS

I will now consider the rates of occurrence and severity with reference to the age groups in which they occur. To an insurance company this is a vital matter as the premiums charged vary in accordance with age for a fixed amount of insurance while in mutual benefit associations, I think I can say generally, a flat rate of premium is charged and a sliding scale of benefits, decreasing with increase of age is paid. Another point is that an insurance company, except in group insurance, knows the age of an applicant while a mutual benefit association, in starting, does not. From what I can find out from our own experience and other sources, 36 would be a fair overage age to cover this question. Our average age remaining at about that figure in spite of a 47 per cent yearly turnover. However it would greatly increase the value of these statistics were it possible to obtain a classification of all claims according to the age groups in which they occur. It would make it easier to compare the rates to those of a standard population and give valuable guidance to the question of the amount of decrease in benefits according to increase in age, or if a flat benefit were paid, to obtain the amount of loading necessary in the younger age groups to take care of this question. Needless to say, however, it would complicate to a large extent, not only the final work on the report, but also the information which the mutual benefit associations would be required to give, necessitating a reclassification of all claims under my scheme according to the age groups in which they occur and, in addition, the supplying of the *average number carried for period* under each age group.

Probably the most important and most difficult question that arises in working out statistics of this kind is that of the average number exposed during the period in which the claims are opened, I will refer to this as the *average number carried for period*.

Insurance companies and our associations at Palmerton obtain this result by using exposure cards. This card gives the dates of entry and exit of every member. At the end of a period the total days of exposure of all members is obtained from these cards and an average number exposed is arrived at by dividing this figure by the number of days in the period. The same result, however, can be obtained by classifying the dues received from members for the period and dividing this by the full period dues for one member. To make this more clear I will give an example. Suppose a mutual benefit association wanted to arrive at the average number carried for a certain year. It was found that \$10,000 had been received in dues during that year and the dues for one member for one year was \$10.00. Dividing 10,000 by 10 it would be found that 1,000 members had been carried for the year. This would be correct no matter how great the turnover had been because any one member would only be a risk as long as his or her dues were paid. I am suggesting this merely because I am not in a position to know to what extent mutual benefit associations generally carry their statistical records and I am attempting to suggest a comparatively simple method of obtaining the average number carried for those associations that might not have this data available.

FORM OF FINAL REPORT

It is essential, first, that there should be one report for male statistics and one for female statistics. Secondly, that there should be a separate report for each of the above classifications according to the waiting periods required by different associations. If it is decided to obtain a classification of claims by ages there also should be a separate report covering the different age groups. For example, there should be a report showing male statistics, between, say the ages of 21 to 25, based on the experience of mutual benefit associations whose waiting periods were 7 days each. Again there should be a report covering female statistics, say between the ages of 31 to 35, based on the experience of associations whose waiting periods were 3 days each, and so on.

A final set of reports could be made that would group the experience of all ages under the different waiting periods. This would be a matter that could be done by classification of the questionnaires and would be of no trouble to the mutual benefit associations. The essential thing is that only statistics that are comparable in all details should be combined and that sufficient information should be given to make these classifications possible.

REPORT

COMBINED STATISTICS OF MUTUAL BENEFIT ASSOCIATIONS

“**ফিল্ড** ১

AGES COVERED
SEX COVERED

AGES COVERED
SEX COVERED

WAITING PERIOD DAYS.....

pg 1120

[illegible][illegible][illegible]

DEATHS									
SICKNESS					ACCIDENT				
GENERAL - ALL CAUSES		GENERAL - CERTAIN CAUSES		SPECIFIC		SPECIFIC		SPECIFIC	
ALL CAUSES	CERTAIN CAUSES	ALL CAUSES	CERTAIN CAUSES	ALL CAUSES	CERTAIN CAUSES	ALL CAUSES	CERTAIN CAUSES	ALL CAUSES	CERTAIN CAUSES
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

non-epidemic or epidemic. The idea in doing this is the possibility of obtaining rates of occurrence and severity of epidemics to be used in determining loading rates to cover this question, and also to make the statistics of associations experiencing epidemics more comparable with those that have not. A further classification of specific sickness is made. By specific sickness I mean those occupational sicknesses not common to all industries such as lead poisoning, anthrax, etc., which are caused by some special industrial condition. By removing these it would make the total average rates of occurrence and severity more valuable as the conditions under which they would occur would be more nearly the same.

Under accidents I have made two classifications, non-company and company accidents. Non-company accidents should only need the general classification of different waiting periods and should not be effected by working conditions. Company accidents are complicated by a number of variables. I have made two general classifications, namely: those associations which pay benefits for this cause regardless of state compensation, and those which pay benefits between the waiting period of mutual benefit association and the waiting period of state compensation. In order to take care of the different waiting periods of different states I have again classified this according to the days required.

As some associations pay benefits for quarantine I have included this classification.

The four spaces appearing under each of the above classifications show total claims opened, total days paid, days per claim and rate per 1,000. Under deaths there are only 2 spaces, which show total claims opened and rate per 1,000.

Deaths I have classified in the same manner as sickness, including non-company and company accident deaths. I might add that it would be possible to combine all deaths regardless of waiting periods or other variables.

The first column appearing in the report would show the groups. I am not going to suggest any group classification at this time as this is a question which can be decided as a guide later. It would be largely a matter of interest as a guide to compare any one experience with the average experience of the group to which it belonged. The maximum classification would be one that showed the statistics of each association separately and the minimum where all statistics were combined in one average. The correct grouping should be one that would take into consideration both the question of sickness and company accident hazards.

FORM OF QUESTIONNAIRE

Each mutual benefit association that co-operated in supplying statistics would be asked to make out two reports, one for female and one for male statistics, providing age groups were not taken into consideration. If they were, a report for each group would be asked for. .

FORM 2

AGES COVERED BY THIS REPORT.....

PERIOD - MONTH..... DAY..... YEAR..... TO MONTH..... DAY..... YEAR.....

ACTUARY'S REPORT
TO BE USED IN COMPILING COMBINED STATISTICS
OF
EMPLOYEES' BENEFIT ASSOCIATIONS

14. ARE THERE ANY DISEASES FOR WHICH BENEFITS ARE NOT PAID? IF SO STATE NAME OF DISEASE OR DISEASES.....

1. NAME OF COMPANY FOR WHOM MEMBERS OF ASSOCN WORK.....

2. GENERAL NAME OF INDUSTRY TO WHICH COMPANY BELONGS.....

3. IS THERE MORE THAN ONE ASSOCN COVERING THE PLANTS OF THIS COMPANY? (Yes) (No).....
(IF SO, AND RECORDS ARE KEPT SEPARATELY, A SEPARATE REPORT SHOULD BE MADE FOR EACH)

4. NO. OF ACTIVE MEMBERS - END OF PERIOD..... NUMBER.....

5. NO. ON PAY-ROLL - END OF PERIOD..... NUMBER.....

6. IF OPERATING UNDER STATE COMPENSATION LAW, WHAT WAITING PERIOD IS ALLOWED BEFORE COMPENSATION GOES INTO EFFECT?..... DAYS.....

7. MAXIMUM LIABILITY PERIOD FOR SICKNESS OR ACCIDENT..... NUMBER..... (Yes) (No).....

8. DOES ASSOCN PAY BENEFITS FOR TIME LOST DUE TO QUARANTINE?..... (Yes) (No).....

SEX COVERED BY THIS REPORT (M or F) ☐

GROUP NO. (DO NOT FILL IN) ☐

WAITING PERIOD BEFORE PAYMENTS START (DAYS) ☐

DOES COMPANY OPERATE UNDER STATE COMPENSATION LAW? (Yes or No) ☐

DOES ASSOCIATION PAY BENEFITS DURING TIME STATE COMPENSATION IS IN EFFECT? (Yes or No) ☐

DOES ASSOCIATION PAY BENEFITS FOR COMPANY ACCIDENT DEATHS? (Yes or No) ☐

TOTAL AVERAGE NUMBER CARRIED NOT EXPOSED TO SPECIFIC SICKNESS RISK OR DUST	TOTAL AVERAGE NUMBER CARRIED SUBJECT TO SICKNESS RISK	TOTAL AVERAGE NUMBER CARRIED SUBJECT TO DUSTY CONDITIONS	DESCRIPTION OF CLAIMS OPENED	TOTAL NUMBER OF CLAIMS OPENED DURING PERIOD	TOTAL NUMBER OF DAYS END OF CLAIMS DURING PERIOD	NO DAYS PER CLAIM	RATE PER 1000	NAME OF DISEASE CAUSED BY SPECIFIC SICKNESS RISK ALSO NATURE OF DUST CAUSING DUSTY CONDITION
A	B	C	D	E	F	G	H	J
			I. GENERAL SICKNESS					
			1. NON-EPIDEMIC					
			2. EPIDEMIC					
			II. SPECIFIC SICKNESS					
			III. NON-COMPANY ACCIDENTS					
			IV. COMPANY ACCIDENTS					
			V. QUARANTINE					
			VI. DEATHS					
			1. NON-EPIDEMIC					
			2. EPIDEMIC					
			3. SPECIFIC SICKNESS					
			4. NON-CO. ACCIDENT					
			5. COMPANY ACCIDENT					

• SPECIFIC SICKNESS (CAUSED BY HAZARD NOT COMMON TO ALL INDUSTRIES)

COL. A = TOTAL DUES RECEIVED ÷ DUES FOR ONE MEMBER FOR PERIOD.

COL. B = C ÷ DUES OF THOSE MEMBERS EXPOSED TO SPECIFIC OR DUST RISK ÷ DUES FOR ONE MEMBER FOR PERIOD.

COL. H = 1000 × COL. E ÷ A OR COL. G ÷ C AS CASE MAY BE.

IF A SPECIFIC SICKNESS RISK OR DUSTY CONDITION EXISTS, SEPARATE REPORTS SHOULD BE MADE, GIVING INFORMATION REQUIRED FOR COLS. D, E, F, G, H AND J - OCCURRING AMONG THE NUMBERS REPORTED IN COLS. B AND C.

IF STATISTICS ARE CLASSIFIED ACCORDING TO AGE GROUPS A SEPARATE REPORT SHOULD BE MADE FOR EACH GROUP.

IF NO CLASSIFICATION HAD BEEN MADE LEAVE ANSWER AT TOP OF PAGE COVERING THIS QUESTION, BLANK.

A SEPARATE REPORT IS REQUIRED FOR EACH MALE AND FEMALE STATISTIC.

In cases of associations whose members were working under either a specific sickness risk or under dusty conditions, a separate report giving information required in column B, C, E, F, G, H and J would be required. In cases where it would be necessary to make more than one report only answers to questions 1 and 2 would have to be duplicated.

The first question asked at the top of the page is "Ages Covered by This Report." If no age classification is decided on this should be left blank. In the squares appearing in the upper right hand side to be answered are "Sex Covered by This Report," "Waiting Period Before Payments

Start," "Does Company Operate Under State Compensation Law?", "Does Association Pay Benefits During Time State Compensation Is in Effect?", and "Does Association Pay Benefits for Company Accident Deaths?". These questions are for classification purposes.

Question (1a) "Are there any Diseases for which Benefits are not paid?" "If so, State Name of Disease or Diseases." It is necessary to know this owing to the fact some mutual benefit associations exclude certain diseases like lumbago, rheumatism, or hernia from the diseases that are paid for, while other associations include them. Comparisons nevertheless can be made of the rates for those diseases which all the associations pay for and the rate for total diseases can be adjusted for those associations which exclude certain ailments.

Questions 1, 2 and 3 will need no explanation, asking the name of the company for whom members of associations work, general name of industry to which company belongs, and if there are more than one association covering the plants of the company, with the request that, if there are, a separate report be made for each association.

Questions 4 and 5 are asked with the idea of obtaining the average percentage of members on the payroll. This is an important question and one that a mutual benefit association should watch closely in view of the large percentage of turnover experienced by most associations.

Question 6 will give waiting period of state compensation law and will be used in classifying company accidents as already explained.

Number 8 covers the question of quarantine and would be used in order to arrive at the combined average number carried so as to compute rates of occurrence and severity.

We now come to that part of the questionnaire that deals with the statistics, the basis of which is the claim register. I think I am safe in saying that all mutual benefit associations keep such a register in which all completed claims are recorded numerically. In order to supply the required information it would merely be necessary to know the number of the first claim opened during the period and the last. When all claims whose numbers came between these were completed, in an association whose members were not exposed to either a specific sickness or dusty condition, it would only be necessary to classify the completed claims first into male and female groups and subdivide these into a classification shown in column D, giving in each case the total claims opened and total number of days paid on claims during period, this would give information required for columns E and F. In an association some of whose members were exposed to a dusty condition or specific sickness condition or both, it would be necessary to separate the claims of those who were exposed from those who were not and then classify these groups in the same manner as I have explained in cases where these conditions do not exist. It also would be necessary to classify the dues received in order to arrive at the average number carried for period asked for in columns B and C.

Column G, "Number of Days per Claim," would be obtained by dividing column F by column E, and would give the rate of severity. Column H

would be obtained by multiplying column E by 1,000 and dividing this result by either column A, B or C, as the case might be and would give the rate of occurrence per 1,000 members.

I would suggest that all associations contributing statistics use the same period and I think it would be advisable to make this period from January 1 of any one year to December 31 of the same year.

CLASSIFICATION OF SICKNESS AND DEATH CLAIMS

The question of classifying the sickness and death claims would be a very simple matter once a standard classification of causes was decided on. In our association we are using the International Classification B Abridged Nomenclature of causes of sickness and death. I think it will be possible to use even a more simple classification and, at the present time, I am seeking advice on this question. The value of classifying sickness and death claims can readily be understood when you consider that it would be possible to arrive at rates of occurrence of the different major diseases, and this would act as a valuable guide in concentrating efforts in disease prevention work.

THE CLAIM REGISTER

The claim register should show only completed claims with each claim in numerical order. It should show whether the claim was for sickness, non-company accident, company accident, quarantine or death. The sex, color, occupation, and age of the beneficiary and, if female, whether married or single, the number of days paid for, and, if sickness or death, the cause. In an association having members exposed to dusty conditions or specific sickness risk, the claims occurring among such members should state this fact. This would be such a simple procedure that I can not conceive of a mutual benefit association letting this stand in the way of supplying such statistics as I am suggesting.

THE PRACTICABILITY AND VALUE OF SUCH STATISTICS

I have no doubt that the question will arise as to the practicability of attempting to combine statistics gathered under such differences as are bound to occur, due to the different by-laws of mutual benefit associations, and also the value of such statistics when combined. I can think of no better way to answer these questions, than to quote parts of a letter I received from Mr. Dean K. Brundage, Assistant Statistician, Treasury Department, Public Health Service, Washington, D. C. In answer to the possibility of combining such statistics and the value of the same, Mr. Brundage says:

"Concerning the differences in length of the waiting and benefit periods, we have found that the problem of grouping associations according to certain provisions is not particularly difficult. For instance, there are any number of sick-benefit associations which begin to pay benefits on the eighth day of disability, and the sickness incidence rate can be ascertained for all such associations regardless of the benefit

periods. When lost time or days paid for is tabulated, it becomes necessary, of course, to group only those associations with the same benefit period.

"In any scheme of comparative statistics of this sort, permit us to suggest that the age and sex of the person sick as well as of the membership should be available in such a way as to make it easy to adjust the rates of each association to a standard population so that both of these factors can be eliminated. Since the sickness incidence rate of women is at least 50 per cent greater than the rate for men when the waiting period is seven days, associations having different proportions of women in their membership will naturally have different sickness rates. Similarly age affects the rate. But the elimination of these two factors is a relatively simple statistical procedure when the data is collected properly.

"If the most important facts about the individual are recorded, and the subsequent analysis shows that sex and age do not explain certain excessive sickness rates, the administration of the fund or the environment of the membership must be to blame, and it is these two things that are usually of most interest.

"Statistics of the sort suggested could be made almost invaluable if properly analyzed and the knowledge used in disease prevention work. Merely the rate of occurrence and the amount of time lost from different specific diseases would show upon what diseases we should concentrate in public health work to effect the greatest reduction in disability. We would obtain a more adequate idea of the economic loss occasioned by illness. An analysis along the lines suggested above would show what associations in any given group experienced an excessive amount of illness compared with the average experience. The results could be traced to their sources, and conditions responsible for excessive sickness corrected."

I hope that this will impress upon the various mutual benefit associations the importance of such statistics and the benefits that could be derived from them, not only from the standpoint of the associations but also for the good of the members and the companies to which the associations belong.

DISCUSSION.

Mr. Dean K. Brundage (Assistant Statistician, U. S. Public Health Service): It might be of interest for me to explain briefly just why the Public Health Service is interested in work of this sort. The service is, of course, very much interested in the health of different groups of workers and of the general population, and in connection with our Industrial Hygiene Office we have been making a few studies of the effect upon the health of some conditions of work which warranted investigation.

In regard to these studies, the service is trying to find out how much sickness occurs among the men who are exposed to these conditions. The absence on account of illness are checked up by visiting nurses in the communities where these studies are being conducted. Of course, these

men are going to be sick to a certain extent because everybody is sick now and then, but what we are interested in finding out is whether or not these groups have an excessive amount of sickness and, if so, what diseases are in excess in the average experience. Unfortunately we don't know what the average experience is; we have no data to tell us what the expectancy is for any given disease or any given disease group. We have to look up the sick benefit associations as one source of this information.

The plan which has been suggested seems to me to be excellent in many respects, and the service will be very glad to cooperate with you people to the limit of our ability.

We have a Statistical Office in connection with the Public Health Service, which is equipped with machines for the mechanical tabulation of statistical data, and while I can't state definitely at this time, I believe that the service could arrange to tabulate mechanically whatever data you might wish to send in to a central agent. Of course, our resources are not unlimited, but to a certain extent I believe we could do that, that is if the sick benefit associations would send in a list of closed cases giving the essential facts that are contained in the claim register, and then at the end of the year report the cases that are not completed, we would then have the data upon which to work a frequency rate if the data to justify it were obtained. This data then would give as a sort of average morbidity experience, that is it would show the number of cases per thousand persons per year of pneumonia and of pleurisy and diseases of the stomach and the groups like respiratory and digestive and skin diseases, and so on.

If it were classified according to age, because age, of course, is a very important thing to consider, we would then have a table which would show the sickness expectancy for a given age group and the rate for diseases that occur.

If this experience covers twenty-five or thirty or forty or fifty thousand people for a given age group, we would have something really valuable, and each association then could compare its experience in terms of the average experience. The benefit to an association would be considerable, it seems to me, for each association would then know how its experience stacked up with the average morbidity experience and the amount or the percentage of decrease over the average or of increase over the average that would be known, and the diseases that were in excess of the average would be established. If you found, for instance, that your pneumonia rate was two or three times what it ought to be, that is a fact you really ought to know in order to get down to some of the fundamental causes for it.

SUGGESTS DETAILED REPORT

I would suggest that a report more or less detailed be included in the plan so that each association gets the maximum benefit out of the combined plan.

We should be very glad to assist you people in any way that we can, because this is a tremendously important subject from the health standpoint and is a matter of considerable importance to your finances.

Chairman Woedtke: I can say on behalf of the National Safety Council, Mr. Brundage, that they fully appreciate and are indeed grateful for the assistance offered by the government through you in coordinating this statistical data.

Mr. F. N. Leonard (Public Service Co., Chicago): I believe that we all recognize the necessity for accumulating such statistics, and I move a committee be appointed for the purpose.

(Motion seconded and carried.)

Chairman Woedtke: We will leave the appointment of that committee to the person you select as your chairman. At this time, before we get into the round table discussion, I notice the members of the nominating committee are back. Mr. Forster, have you a report to make?

REPORT OF NOMINATING COMMITTEE

Mr. Forster: The committee places in nomination Mr. Harold A. Ley of New York, Mr. F. E. Chapman of Chicago, for chairman and vice-chairman respectively, and Mr. H. N. Dambmann of the New Jersey Zinc Company as secretary.

(Motion made, seconded and carried that the report of the nominating committee be adopted.)

Mr. Forster: May I make one further motion, that it be the consensus of opinion of this group that the chairman be authorized to appoint such committees in addition to the statistical committee as in his judgment may be desirable and to the best interests of the section.

(The motion was seconded and carried.)

Now we are down to what we call in the safety game the real center of the pudding.

ROUND TABLE DISCUSSION

SHOULD THE GOVERNMENT TAX ASSOCIATION FUNDS?

Mr. B. L. Odle (Industrial Mutual Association, Flint Factories, Flint, Mich.): We had an experience recently, regarding this matter. The Revenue Department required a tax from three different points of view; one was a tax on our membership; another was a tax on capital stock, so-called, and the third was as a mutual insurance company. I believe this question is so important to the benefit associations as non-profit organizations who do not pay dividends but are organized for the benefit of employees in industry, that something ought to be taken up by us in a co-operative way, in order that we may get at this matter and get it straightened out.

Mr. A. B. Drummond (Wilson & Co., Chicago): I feel quite strongly on the subject that it was never intended, when the law was passed, to include the mutual benefit associations. One thing that might be done would be to

suggest to the new chairman coming in that he appoint a committee to go into this matter still further and see if we can't get some results different from what we are getting now. I have discussed this matter with some 75 organizations, and they have all stated they have taken the matter up as individuals through some certain source or other. I have had the experience of the two gentlemen who have spoken. We also have a letter that we are exempt, but we still pay.

If I may be allowed to make a suggestion that the chairman consider appointing a committee to go into this matter thoroughly, and if it is decided by the committee, the proper thing to do would be to proceed in unison to get this ready for the next session of Congress. I think it can be accomplished in that way where we can't get it done as individuals. I put that as a motion.

(The motion was seconded and carried.)

ARE MEDICAL EXAMINATIONS FOR ADMISSION ADVISABLE?

Mr. Chapman: The experience of the Harvester Company's benefit association in requiring physical examination for employment, no matter how high the position or how low in the ranks, is to have every new employee undergo a physical examination as a condition of employment. If he wants to become a member of the benefit association it is up to him and the physical examination is required. That physical examination has brought some startling results to our attention, and the Harvester management and the benefit association board of trustees realize that a physical examination is the proper thing. We catch incipient tuberculosis, we catch cancer and a thousand and one different things in the new employee that means a 52 weeks disability case within three months if we take him in. We catch high blood pressure, arteriosclerosis, old age diseases, and all that sort of thing. At the rate of contribution today you have to safeguard the fund. We reject them just the same as an insurance company rejects you with heart disease. He may have a heart trouble but still be accepted for certain occupations.

Question: Do you take them on as employees and reject them as mutual benefit members?

Mr. Chapman: Unless there is an extreme hazard.

Chairman Woedtke: I know of one case where a man is so well along in years that he can't get anything in the way of life insurance in any other way; he will get himself a job with a company and stay there long enough for the sole purpose of getting in under their insurance feature. It may be that the picture is painted too black, I don't know. This is an entirely different phase than you hit this morning. It is a question now of whether medical examinations should be required, and if so, to how great an extent before admission into the association.

Mr. Shafer: In our benefit association we accept the employee below the age of 60 that has passed the company examination for employment. We feel that we are perfectly safe there for the reason that a good many of the conditions that Mr. Chapman mentioned that would eliminate the

man from joining the benefit association eliminate him from employment with us to begin with. Our examinations are reasonably stiff, and I don't see where our second examination would do much good or harm either way.

Chairman Woedtke: Mr. Chapman, do you have a second or just a first examination?

Mr. Chapman: Just the one.

Chairman Woedtke: Suppose they go to work now with a bad condition and three months from now want to go into the association, do you refer to the original examination?

Mr. Chapman: Yes, and if conditions justify we recommend a re-examination.

Mr. Ley: It seems to me that you have got two or three entirely different questions. I think the employer has a perfect right to insist on the examination of a new employee.

Chairman Woedtke: If it is a society run by the employees, it is up to the employees to state under what conditions the men may come in. My own feeling is very strongly that that should be a problem solved by the employees.

Dr. Charles J. Steim (Medical Director, Philadelphia Company, Pittsburgh): I have had some 25 years' experience with mutual benefit associations, and I have never found any objection on the part of any member to an examination; in fact, they all insist, in self-protection, upon it. It is insurance and the risk is carried by the fellow-members. If it is partly carried at the expense of the employees, they have a right to know how much risk they carry. If it is a philanthropic thing, purely and simply, and it is just simply used to prevent passing the hat when anybody gets sick, that is a different thing.

Mr. Harry S. Moody (Bausch & Lomb, Rochester): If you let a man come into the association that has not the required health that he ought to have, you are just adding overhead.

LIMITED BENEFIT

Mr. Chapman: I would like to briefly quote from the Harvester by-laws:

"Section 1. The object of the Employees' Benefit Association is to provide its members with a certain income when sick or when disabled by accident, and to pay their families certain definite sums in case of death, to create and maintain a fund which shall long to the members to be used in the payment of benefits to them and cost them the least possible money considering the benefits received."

The next thing is eligibility to membership:

"After January 1, 1909, any employee not over 45 years of age may, upon passing a satisfactory medical examination and upon the approval of his application by the superintendent, become a member subject to the conditions of his application. Furthermore, any employee over 45 years of age may, upon passing a satisfactory medical examination by

the superintendent, become a member subject to the conditions of his application, except that the death benefit in such cases shall be limited." That is, where we take the man in that is 60 or 65, we limit the death benefit. We have taken them in as old as seventy-eight. We all know what the life expectancy of the man of 78 is. He is going to go very shortly. We couldn't take a man in and have him stay in a couple of years, pay the regular dues and pull down a \$2,000 death benefit, therefore we limit that death benefit to \$200. Between 45 and 52 there is a graduated scale. Above 52 years of age the death benefit is limited to \$200. Below that the sickness death benefit maximum is \$2,000 and the accident death benefit is \$4,000.

Mr. Farber: Our mutual aid has been in existence for the last twenty-three years. We started in with about a thousand members, and today we have about 29,000. They have accumulated a surplus of \$110,000.

Mr. Chapman: What are your benefits?

Mr. Farber: Fifteen dollars a week, \$220 death benefit. On July 1 we paid out \$42,000 in excess of our income.

Mr. Chapman: Your surplus is bound to grow because you don't pay very much for death benefit.

Mr. Farber: We have a club in connection with it consisting of a bowling alley, pool tables, shower baths, and we have a band. We lost \$5,000 last year on the band. We have a school with an average attendance of 2,000 students. And we have a recreation department. The dues are \$1.20 a month.

Mr. Chapman: How long do you pay that disability benefit?

Mr. Farber: Thirteen weeks.

SHOULD BENEFITS VARY ACCORDING TO AGE OF MEMBER

Mr. Winans: May I ask if any one here can answer whether there is any actuarial information which would indicate by percentage how much you happen to load your dues? Assuming \$1.00 a month dues, in case you change your benefit period from 13 weeks in any calendar year to any 13 consecutive weeks, do you get the difference? Assume that your dues are \$1.00 a month for a \$15.00 benefit, which is the general run. how much would you have to load that to change your schedule to any thirteen consecutive weeks?

Mr. Dambmann: The only thing I can say to that is that we have in our association a three-day waiting period, and most of these statistics are based on seven days. It is perfectly possible to put a three-day waiting period back into a seven-day by simply throwing out the claims of less than five days' duration, which would convert a three-day into a seven-day period. We have a 13 weeks' maximum for one illness in a period a year, and out of 639 claims that we opened for sickness, only nine of them have run beyond the 13 weeks' disability period.

Mr. Geo. W. Stone (Hooker Electrochemical Co., Niagara Falls): The benefit arrangement we have is not a fixed amount of weekly benefit nor a fixed amount of weekly dues. Our idea is to pay 50 per cent of the man's weekly wage when he is receiving benefits. His dues are one per

cent of his weekly wage. That is, if a man is earning \$30 a week he pays thirty cents a week, and if he is earning \$50 a week his dues are fifty cents, and in the first instance he gets \$15 a week benefit. We have been doing that for nearly three years. We are creating a surplus. We are reinsured and we have been paying a premium to the insurance company. We have created and accumulated a surplus because we don't pay quite as much to the insurance company as we collect. If we did not pay to the insurance company we would have a greater surplus because our experience has been good. We do not have life insurance included in that. We have just disability for accident or sickness outside of compensation.

In addition to that the company provides group life insurance for the employees, and the company pays for that. They do not contribute directly to the benefit association.

Mr. B. Frank Day (Philadelphia Electric Co., Philadelphia): We have been operating on that plan for 17 years on the one per cent basis. In other words, the man earning \$100 a month would pay \$1.00 a month deducted from his pay-roll monthly. We pay half of his earnings for sickness, we pay full wages during the compensation workmen period, and after that period begins we pay him the difference between compensation allowance and his full wages. We have accumulated under that plan a surplus of more than \$100,000, so it seems that the experience rather justifies continuing liberal benefit on that basis. We make the death benefit assessment features independent of the other feature. There is an assessment of 20 cents. The minimum death benefit is \$750. At the end of five years' membership that becomes \$1,000, and then we add \$100 per year until we reach a maximum of \$2,500. In addition to that we have burial benefits which are paid at the death of the member to the member's wife or children. We also take care of special sickness benefit in case of incipient tuberculosis, and urge the member immediately to take up treatment, and that benefit is full wages for a period of one year. Our experience has been that within that time all the cases we have handled have come back to us for service.

Mr. G. R. Morrison (New Jersey Zinc Co., Franklin, N. J.): We require a doctor's certificate from every man who is sick. The secretary consults the doctor as to how long the man will be sick. In addition to that he visits the man at least once a week, and if he is in doubt as to whether he should be back at work or not, he brings it before the board of directors who pass on the case.

DIVISION OF COSTS BETWEEN EMPLOYER AND EMPLOYEE

Mr. Ley: I think the solution of all those problems comes down to who pays the bill in the final analysis. If the men are paying the bill they will make it their business to see if the man is malingering. If the employer is paying the bill I defy any employer or any insurance company to put a man back to work when he can bring a doctor's certificate

to say that he should not work. You can bring all the doctor's certificates in the world, if the men think he should go back to work they will tell him to go back to work.

Chairman Woedtke: I am going to ask all those who have associations where the company contributes toward part of the expense of maintaining the association to raise their hands. Now those who don't. It is about three to one in favor of the company contributing.

At this time I am going to present the gavel to the new chairman.

(Mr. Harold A. Ley took the chair.)

Chairman Ley: Looking at it entirely from the point of view of the employer, I think if this mutual benefit society is run right it has tremendous possibilities. I think we can revolutionize this country just through such organizations as this, because there is no field that I know of that opens up such possibilities for constructive work as healthy employees. It is the one and only thing that I know of where the employer's interest and the employee's interest are identical. The employer can make more money out of healthy men and the employees can make more money, and, which is more important, they have happiness and everything that comes from the eradication of sickness.

It seems to me in listening to these discussions that the one big thing we have been overlooking is the constructive work that should be done in industry to remove all this preventable sickness. We have seen 125,000 people killed in Japan by calamity. There are 500,000 people that die every year in this country from preventable diseases, and we don't bat an eyelash, nothing is done.

Mr. Woedtke: What about the straight time man?

Chairman Ley: I feel we shouldn't pay him anything. If he has an opportunity to join on 25 or 50 or one per cent of his wages basis and he elects not to join; then the firm is relieved of all responsibility in his case.

Dr. Steim: I think a good many members of this section would appreciate it if you were to give the psychology of the employer on this question of selling employees' benefit associations. A good many I have talked to don't have any mutual benefit associations for the reason that they have not been able to sell it to the controller of the company.

Chairman Ley: I will be glad to tell you why it appeals to me, just from the selfish standpoint of an employer. If I have learned anything in business it has been that the men who have made the money for our organization are the men who feel friendly and kindly toward us. I don't believe any concern ever makes a dollar out of a grouch. Three problems that every employee is up against is what happens to him if he is taken sick, what happens to his family if he dies, and what is going to happen to him in his old age. Any employer who can help him solve those problems is certainly going to get a little more good-will from that man, and it is in trying to work out those problems that we started in giving our people group life insurance to start with. We were one of the

first companies to give that. The next thing that we did was when I got interested in this preventive work of the Life Extension Institute, and we gave our people the services of the Institute. But that was not satisfactory because I found that a lot of men were taking examinations that we were paying for simply because, I imagine, I asked them to or intimated I wanted them to, and that ended it.

I had come to the conclusion, in coming in contact with other employers, that if they intended to give the people physical examinations they should have those men pay part of the expense and only give it to those who were willing to do that. The minute the man had to buy something and it was optional with him whether he would take it or not, he would make up his mind that he was going to get 50 cents' or a dollar's or two dollars' worth for what he was asked to pay.

Mr. Chapman: We find that the percentage of high blood pressure is high among the class that doesn't do any manual labor, such as executives, department heads, general foreman, sub-foremen. We also find that they have leaks of the heart. A rest is recommended and is always heeded and the trouble corrected. Reduce the blood pressure and you don't have a man drop dead at his desk.

Chairman Ley: We have had examined at the Institute this year 75,000 people, and 50 per cent of the people we have examined have had some serious trouble and didn't know it. That exists in every industry.

ADJOURNMENT.

Engineering Section

October 3, 1923

GEORGE T. FONDA, Chairman,

Fonda-Tolsted, Inc., Chicago-New York City
Columbia Salvage Corporation, New York City

W. S. PAINE, Vice-Chairman,

Research Engineer, Aetna Life Insurance Company, Hartford, Conn.

SIDNEY J. WILLIAMS, Secretary,

Chief Engineer, National Safety Council

LUNCHEON AND AFTERNOON SESSION

THE ENGINEER AND CONSERVATION

DR. R. M. LITTLE, DIRECTOR, BUREAU OF REHABILITATION, STATE DEPARTMENT OF EDUCATION, ALBANY, N. Y.

The service which the Engineering Section has been rendering to the National Safety Council, the very becoming behavior of its membership and its widening influence are to be commended. The section is not an exotic group, added to from without, but an indigenous plant that sprang up out of the very life and objective of the Council. It has been serving all the members of the Council by thoughtful, well prepared technical discussions and increasing the prestige and influence of the Council as a national movement in relationship to the old, well established engineering societies and governmental agencies. And the section is placing this great body of active industries and men in a very potential relationship to the formative opinion of our country that has to do with all engineering problems and constructive methods in our national life.

One happy thing is this: that the men who formed the section and are developing its policies are themselves linked with industry and in touch with all the other men in industry; that is, you are men upon the job. You had the spirit of the safety movement within you, and, therefore, you have never at all drawn apart from the major purposes of the Council but have been keeping as your watchword the ideal of the Council; namely, service. As long as this condition continues, and there is no reason to suppose that it will not always continue, it seems to me that the Engineering Section of the National Safety Council has not only a great future, but very splendid responsibilities to discharge, in the great endeavor in which we are all sharing, to bring about a safer, healthier national life.

COUNTRY NEEDS CULTURAL DEVELOPMENT

Now, that, which I wish to bring to you, is not at all a technical thought. but, rather a picture of what seems to me to be a great need in our country. This great need is a better organized economic and social life as a basis for a cultural life. America is a young nation, only 150 years old, about 300 years since the first colonization, and certainly not much more than fifty years since we had a unified national consciousness. We are a young people and have all the vitality and exuberance, bloom and promise of youth. We also have the forwardness and irregularity of development of adolescent youth. Our national life, in comparison with the mature and mellow life of many old countries, is much like the alert, muscular, awkward youth of 18, compared with a rounded out, well poised man of 45. In addition to our youth, we have a magnificent physical empire in the process of economic development. This bigness of domain lends itself to the stirring of our imaginations and gives us the opportunity to do things in the United States on a large scale, lending our energies to mass production. The unlimited resources of our country stimulate the acquisitive activities to such an extent that we are not satisfied to do anything on a small scale. The small refined industries slowly develop. In some sections they are completely overshadowed by huge manufacturing plants. Indeed, organized public sentiment in some communities for years overlooked the need of developing smaller industries which would use the mass products of the large. Again, it is not only the youth and size of our country, but the resources within it, the hidden treasures under the soil, within the soil, the waters and the air that have stimulated our activities. Youth, size, wealth, combined together, with a great selection of people, native and blended stocks, which cause the type of life we are developing here in the United States to be one that is extremely interesting and fascinating, and also sends us along with a rush and a hurry that does not permit us to stop and take time for the necessary refinement that comes with age and maturity. Our hurried life is giving us an industrial and mechanical development that moves forward like great ground swells, so rapidly that our Safety Movement is always running after to try to catch up with it. and in many respects, we cannot keep up with the industrial and mechanical development which is taking place. The great stimulating, elemental facts which make up our national life are causing us to go forward with leaps and bounds in mechanical and industrial development. Our Safety Movement, therefore, as I say, is rushing after and trying to catch up to and not always keeping pace with many of the lines of industrial development. This being true, and I believe you will all agree with me that it is true, at least as a generalization, does it not make a magnificent opportunity for the engineer with his trained mind and technical skill? If an engineer has a large field of interesting opportunity anywhere, it is in a new country where there is tremendous need of constructive skill in development, in relationship to boundless resources and untold wealth. Such an environment should stimulate his mind and imagination and

cause him to do his full part in the great national scheme of not only helping to produce more wealth, but also to work out a more normal, sane, healthy and safe life for the people.

THERE IS NEED FOR DISCIPLINED MINDS

Some of our first engineers were trained at West Point. Others received their training before coming to this country. Many were trained on the job because the exigencies of our national life demanded engineering skill before technical schools were founded. One was started on the Hudson generations ago and now we have many of them—well equipped with rich curricula, able teaching staffs and thousands of students. The educational system of the country is attempting to do its part to furnish in sufficient numbers, well trained engineers for the country's need. A few are still being trained by experience, and by personal study. There is need of a large body of men with disciplined minds and acquired skill to furnish forethought, poise and judgment which should be wrought into all of our economic life.

But we not only need many engineers who are equipped technically, but we also need many who have ideals and principals to guide them in the practice of their profession, men with an enriched imagination and a larger view of the meaning of things which they are doing beyond that which can be worked out on an accounting sheet. The mind that is trained and the life that is serving should carry along with it in corollaries something greater than technical skill, that something which will cause our lives to count in more ways than as technicians. The engineer, therefore, who is imbued with Safety, whose life has taken hold of it and who thoroughly believes in Safety as a fundamental necessity in the practice of his profession, becomes a most important person in our great economic order.

This Engineering Section is not only a leavening of the membership of the Council with a respect for higher standards from the point of view of the engineering profession, but it is also a group of men within a large national organization who are received and listened to with becoming respect by the great mass of engineers and technicians of our country.

PLEASURE ECONOMY IS NOT ENOUGH TO SATISFY LEGITIMATE WANTS OF MANKIND

If 40 per cent of our industrial activities result in waste, we can only hope to become more frugal in the use of our resources through the leadership of trained minds which can prevent waste, standardize the processes, enrich the thoughts and refine the spirits of the people. This sort of service requires imagination and the emotions to be stirred by a great ideal. Safety furnishes the ideal and stirs the emotions.

We American people very seldom stop to ask why we want to build more automobiles to run upon the streets and highways, making it necessary to build more roads and to produce more gasoline to run more automobiles... I say we seldom stop to ask what it is all about.

What is the aim in constantly multiplying the mechanical development of our country and accelerating its movement if we have not gumption enough to reflect upon the type of a national life which we are developing? Is a pleasure economy enough to satisfy the legitimate wants of mankind? It never has been.

One who has recently returned from a few years' stay in Europe where he was observing the industrial and economic life of that continent, has called our attention to the fact that while in European countries they do not have a great safety movement like we have, they do have a much safer national life, apart from their wars.

We are killing workers twice as fast in the industries of the United States as they are in the industries of Europe and more than twice as fast in public life. This is true not only in industry and public accidents, but it is also true as to homicides. We sometimes imagine that we are a more law abiding people than the Europeans, but the fact is that we are not. Life is a cheap thing in America compared with most other countries. In another respect we do not compare favorably with some older countries; namely, in regard to our family lives. We have too many divorces. About one in seven of all our marriages is dissolved by the divorce courts. In addition to divorces, we are plagued with a great number of husbands who disappear and fail to support their families. Some time since a high class play, "The Bill for Divorcement," which ran for months in London to crowded houses, was brought to New York City. It was a serious drama with a star cast, but it did not last two months in New York. Why? Because the problem which was dramatized as to whether or not insanity should be a ground for divorce is lightly considered in our country. But in old England they are still concerned with the integrity of the family. We play fast and loose with it.

Consider another illustration from England—the question of Safety in mines. They have almost three times as many workmen engaged in their mines as we have, and yet they do not mine as much coal, but we lose three times as many miners as they do. Your answer may be that we mine three times as much coal. Yes, we do. That is the very point I am making. We will get the tonnage out in America at any cost. We will do the thing in a big way, no difference how many lives are snuffed out in the process.

All these things are elemental but fundamental. They are a part of the warp and woof of our national life, due in part to youth, bigness, wealth, bustle. We get so speeded up that we do not stop to think what it is all about.

THE CONTRIBUTION OF THE ENGINEERING PROFESSION

The trained engineer comes along, and if he has some understanding and imagination and grows in his profession, not only as a technician, but also as a leader and teacher, he can help to stabilize and refine the life of the American people, and it needs to be done.

Usually an engineer has to do with new construction and the revision of old, and this gives him the chance to get in on the ground floor in all our industrial and mechanical enterprises. If he is imbued with the

safety concept, and his ethical nature is motivated thereby, he can introduce the conception of human values as well as economic values into the fundamental organization of the economic order. After all, the most important part of our national life is its economic processes, and if your profession can gradually incorporate something of the ideals and feeling of human worth in the industrial processes, your service will have a great influence upon the well being, the happiness and joy of all our citizenship.

The engineering profession, it seems to me, can contribute to this end as much as any of the learned professions. Indeed, you can affect the economic processes for human welfare much more than the profession in which I was educated and first served, or the one in which I am at present engaged. The minister has his message to give, the educator his influence to contribute, the governmental official his duty to perform, all of which are important to our national life, but because of the vastness of our economic interests, the engineering profession can do more to get hold of the great energies of America and bring them under control and cause them to function for the welfare of the people than any other profession. This brings me to an idea which I wish I had the ability to express to you. It is an idea which reaches into the nature of the whole scheme of things of which we are a part. Mr. Whitney, in his splendid paper on the philosophy of the Safety Movement, endeavored to tell us something of this idea, this meaning which is in the center of all things. He has been pondering it in his mind for a long time, and has given it to us in a stimulating paper. He has also tried to have it produced in a drama, but I suspect he feels that it is not yet effectively expressed as no one can ever express the ultimate meaning of things which he sometimes feels or senses. This idea which we are struggling for, the philosopher calls reality, an ethical teacher calls it truth, an economist may speak of it as value. A word is but the skin of a living idea. It is not so much the words as the idea itself which is important. It is not the word but the idea itself which I would like to reveal. It is the ultimate meaning of all things. To get hold of that center of things, to feel its energy and know its potential part in production and the enrichment of life, to work with it in harmony, to bring it out in service, that is the great achievement in a creative service. To do so one must be more than a technician. He must be a man of insight and understanding who senses and feels the great creative urge of the universe itself. To touch that dynamic center of all things and do one's work under the inspiration which it gives, is to come into unity and harmony with the great creative purpose of the invisible world.

THE RELATION OF THINGS TO ETERNITY

As engineers you are dealing with the things which you see, touch and handle, but they are all related to something unseen and eternal. Even the things which we see, touch and handle are but the coverings of the unseen energies which are in the universe. Did you read Sir Ernest Rutherford's "Presidential Address," delivered at the opening of

the British Association of Scientists in which he was discussing the atom? It was a memorable address for which the scientific world had been waiting in great expectation. I read part of it with breathless attention. We had been wondering if the physicists were to find some way to release the potential energy of the atom and make it serviceable in a practicable scheme. According to Sir Ernest's address there is not much hope that this can be done but as a leading physicist of the world, he reveals to us the fact that the little invisible atom is a solar system in itself, that there are revolving around its minute center moons and stars just as there are in our solar system. Oh, what wonders are being revealed to us by the investigations of scientists in the phenomena of nature! The physicist and the chemist unfolds no greater wonders with the microscope than the astronomer shows us through the telescope. Sit with a leading astronomer as he lectures upon the unseen stars of the universe and shows us photographs of the other solar systems far greater than ours and more numerous than we have ever imagined. The mind and imagination are overwhelmed by the vastness of the universe of which our little solar system is a part, and through it all there seems to be running a principle of unity, order, harmony and forethought.

We are a part of this great scheme of things, with minds and imaginations to catch the meaning of it all, and with hands and wills to touch the energy, value and truth, and harness it for human welfare. If we have minds to think and emotions to be stirred and wills to be energized, every one ought to want to get hold of the great ultimate energies and bring them out into a complete harmony and co-ordination which will incorporate the inner meaning in the outer and visible activities of life. You, as engineers, motivated by a great ideal, can make the great discovery that the Safety Movement in its philosophy and method is in accord with the inner law of the universe.

THE JOY OF LIFE IN SERVING

I was playing golf with a friend at the country club the other day. He is a very responsible business man. We stopped for a moment to admire the beauty of the fall foliage. We were surrounded by it. My friend is a thoughtful man with considerable spiritual insight, whose mind is always searching for the hidden meaning of things. We both expressed a spiritual uplift in the sense of beauty and harmony of the surrounding hills and foliage. We felt that there was something wonderful speaking to our better natures. This led us to speak reverently of God and I said to my friend that I conceived of God as the great Conservator—He does not believe in waste. Apparently nature is prodigal but only apparently. The rich foliage on the hillsides with the resplendent colors of the fall time will soon pass away but will reappear again next year that in every season there may be this expression, through nature, of God's loveliness. He is a great painter, a wonderful poet, a master musician, a creative engineer and a gracious heavenly Father. No, he does not believe in waste. He would have all things work

together for our good. He would have us work together for each other's well being and He may be depended upon to give us inspiration and energy in all the noble service of life. This is a Christian conception of God whose creative processes have never come to an end and never will. We may not use his name when we speak of the ultimate reality of truth and of value, but some way or other we believe that in the center and meaning of all things His presence dwells. Reverently, with inspiring minds and a believing insight let us strike our natures deep into the ultimate reality, discovering there the truths and measuring the values which can be wrought out in the economic and social order, and when you have the sense that all these meanings and forces are working together, they will give a glow and inspiration to the practical job, in the office, the mill, the mine and the shop which keeps one from sterility of thought and tiredness of heart, keeps one from missing the joy of life in service, which if one does miss, said Stevenson, one misses all. When the ultimate meaning comes rushing into one's consciousness, creative skill is aroused and the disciplined mind and poised touch can give not only increased values but better proportions and bring about a co-ordinated national life which will be truer, deeper, richer and more satisfactory for us all.

REPORT OF THE CHAIRMAN

GEORGE T. FONDA

It was decided this year that we would not attempt more than one meeting at the Congress for the simple reason that the membership of the Engineering Section involves practically all of the sections of the Council. So we decided early this year that we would hold meetings in different cities during the months intervening between the Congresses and arrange to work with local engineering societies and local councils in certain of the large cities.

We were pretty successful in those meetings. We had the first in New York City, a joint meeting with the American Society of Safety Engineers, an all-day meeting and an evening session, with excellent attendance. The second meeting was held in Chicago and was backed by the local engineering society and the Chicago Safety Council, and we had a most successful series of meetings there, ending up with a dinner, attended by more than 500. The next meeting was in Detroit on a similar basis. So we have concluded and will recommend to the incoming officers that they continue this scheme, and in the coming year we have tentatively made arrangements for a joint meeting with the American Society of Safety Engineers in New York; in Chicago, in Cleveland, in San Francisco, and another meeting in the city that will be selected for next year's Congress, in sufficient time to give them a little interest in safety work in advance of the Congress, which is always a good plan.

I would like to remind you of the desirability of increasing the membership of our Engineering Section. We are trying in various ways to get the idea out to the members of the National Safety Council that the

Engineering Section is not a section of safety engineers alone. Essentially it is a section of men who are doing engineering work of all kinds. Regular membership in the Engineering Section is based on ten years of engineering work with five years in responsible charge. Associate membership is based on three years of engineering work. There are no dues, as you know, no initiation fees, for men connected with companies who are members of the National Safety Council. Safety men should take this opportunity to have the engineers of the organization connected with this Engineering Section. It will help the safety man because it will give him an additional contact in his organization; it will give the safety man a chance to do just the things that Dr. Little was telling us about.

The other important thing is that it will give the National Safety Council a larger group of technically trained men, on whom they can call as members of sub-committees to work on codes and the development of technical subjects, the solution of technical problems which are constantly coming up and which can only be treated by committees made up of men who should be members of this Section.

I hope that you will all make a special effort to get behind the meetings that are going to be held during this year.

REPORT OF THE NOMINATING COMMITTEE

F. A. DAVIDSON, CHAIRMAN

The committee recommends that the by-laws be amended to provide for the two most recent past chairmen to automatically become members of the executive committee. In this, we are simply following the plan of the National Safety Council itself.

(Motion made, seconded, and carried that the recommendation of the committee be adopted.)

Mr. Davidson: The Nominating Committee proposes the following gentlemen: for chairman, Mr. W. S. Paine; for vice-chairman, Mr. J. I. Banash; for the three places on the executive committee that are to be filled this year, Mr. C. R. Alling, Mr. R. McA. Keown, and Mr. J. R. Brownell.

(Motion made, seconded and carried that the report be accepted and the nominations be closed, and the secretary instructed to cast the unanimous ballot, and the officers declared elected by the chairman.)

REPORT OF ELECTRICAL COMMITTEE

S. E. WHITING, CHAIRMAN

We were appointed about two years ago to accumulate statistics of electrical accidents. Our field of activity has never been very carefully outlined, but I assume that we are dealing with the electrical hazard in industry in general, not the special electrical hazard of the public utilities, which is treated in other sections more technically. I also assume that we are dealing with low voltages, perhaps below 600 or 700 volts.

Mr. Williams sent out a form of report for such accidents, and they were quite generally distributed with the request that reports on electrical accidents be sent in some detail for us to analyze. The situation

now is that we have about 130 reports on these blanks. That, of course, is not sufficient to make any detailed analysis from. Unfortunately, also, the blanks are not filled out in very much detail, so that we can't say, for example, whether the accidents occurred on open switches or on enclosed switches. I should say further that these reports were for electrical shock accidents on switches rather than on other electrical apparatus. I don't know just why that idea was started, to determine whether there was a genuine need for closed switches, whether or not they were distinctly superior to the old open knife switch, but anyhow, we are getting statistics along that line which may some time be of value.

This hazard we are dealing with on low voltage is not a trivial hazard. It may be a fatal hazard, and if we can prevent even one or two fatalities, I think we will justify the effort to go into the hazard.

It is very generally assumed in industry that no person can be killed on low voltage; that where they are killed, apparently from low voltage, the real situation is that a high tension leak has gotten through from the primary wires at 2300 volts or higher, and charged the secondary system to an abnormal voltage. I am thoroughly convinced that that is not the situation from the experience of my own company with electrical shock cases. We have, and are now accumulating in our own experience and other experiences that come to us, at least 25 genuine low voltage fatalities. Some of the cases were very carefully checked up to throw out any chance of high tension leakage. They are genuine low voltage fatalities. Some of them are 440 or 550 power circuits. Some are on 110 volt lighting circuits. The Bureau of Standards confirmed that impression, that you can be killed on low voltage from their own researches. So you are considering a hazard that may prove fatal. In these 125 reports we have about a dozen that were fatalities, and presumably low voltage fatalities.

EVEN SAFETY SWITCHES NEED CAREFUL ATTENTION

You may feel, if you have ordered the removal of all open knife switches in your plant and the installation of enclosed or so-called safety switches, that you have done your duty, and that thereafter you will not have any fatal electrical shocks. Unfortunately, that is not going quite far enough, because some of the fatalities, probably most of them, have occurred on the enclosed type of electrical apparatus, enclosed switch or enclosed starting box. Some of these deaths have occurred on those safety types of equipment, where there is no exposed live part apparent. The reason is that the equipment gets out of order, the insulation between the carrying parts that are enclosed and the enclosing case itself breaks down and places a charge on the enclosure. That has sometimes been doubted, but I have personally in two cases, a day or two after the fatality, gone out and found by actual test that the charge was on the enclosing case, and the person who was killed in the handling of that case in starting the motor or throwing on the switch put his hands on something that was alive when it was supposed to be dead.

Those cases are extremely aggravating for the reason that there is a very simple practical prevention of that charging of any known current-

carrying part of your equipment. If you will see in your plants that all of those cases are permanently grounded you will eliminate the danger of accidental charge, and so far as my own experience goes, you will cut out a great majority of these low voltage death cases. I don't say the enclosed switch is not justified. It is justified. But you should go further and see that the switch is properly grounded. Don't depend on the electrician to do that work, because until quite recently the National Electrical Code has not made mandatory the grounding of the starting box or the switch case, and he may therefore omit such grounding.

The matter is particularly important in damp locations. Look particularly to the places where you have a damp place where the operator is well grounded, because those are the conditions under which he may get a fatal shock. On lighting equipment at 110 volts fatalities are still rare, but they are nevertheless genuine. Don't let your men use brass sockets in damp locations. Don't let them use brass sockets going into boilers or tanks, because there they are particularly well grounded, so that the low voltage is enough to send a fatal current through the body. I hope the Committee can later on make a more definite report on the subject.

(Motion made, seconded and carried that the report be adopted.)

REPORT OF MEMBERSHIP COMMITTEE

J. I. BANASH, CHAIRMAN

The chairman in his address gave most of the aims and objects of the membership committee. It remains for me to do little but give you the figures on the final check-up. We find that we have at the present time the largest membership that the Engineering Section has so far had. During the last six months new applications have been received in considerable numbers, and in addition to the figures which I am going to give you, there are several which have been received that we have not yet been able to act upon. The total membership of the section at present in good standing is 269, divided as follows: Members, 174; Associate Members, 95.

We hope that during the coming year we can not only increase this total membership considerably, but increase it in the right way, that is, by the addition of people who are not only going to do some good to the section and the rest of the Council, but also to themselves from their association with us.

We had one or two peculiar experiences. We have had it happen that a man applied for Associate Membership and his qualifications were obviously such that he should be a full Member. We felt it incumbent upon ourselves to make him a Member, much to his surprise, I suppose. We have had the opposite happen also, where we regretted that a man's experience did not warrant full membership. The section has always been particularly careful to point out to all such applicants the proper course of procedure to obtain full membership, and to advise them the committee would automatically advance the grade where nothing but the term of years was necessary.

(Motion made, seconded and carried that the report be accepted.)

REPORT OF COMMITTEE ON GUILLOTINE PAPER CUTTERS

W. S. PAINE, AETNA LIFE INSURANCE COMPANY, CHAIRMAN; S. E. WHITING, LIBERTY MUTUAL INSURANCE COMPANY; F. M. BULLEN, U. S. CASUALTY COMPANY; T. S. WALLING, MCGRAW-HILL COMPANY; A. P. COSTIGANE, ONTARIO PULP AND PAPER MAKERS SAFETY ASSOCIATION, AND L. WM. FERGUSON, AETNA LIFE INSURANCE COMPANY, SECRETARY.

Guillotine Paper Cutters used largely in the paper, printing and book-binding industries are a source of numerous accidents of a serious nature since loss of fingers or hands frequently results.

A committee appointed from the Engineering Section of the National Safety Council has been studying the hazards and methods of safeguarding these machines for the past year. Inquiries have been sent to most of the manufacturers of Guillotine Cutters in this country as well as to a number of users of such machines, for information as to the most effective and practical safeguards that may be applied, from the viewpoint of both maker and user. A digest of such information received together with the observations of the committee on the subject is here given.

HOW ACCIDENTS OCCUR

It has been found that accidents on power paper cutters usually occur because one of the following conditions obtains:

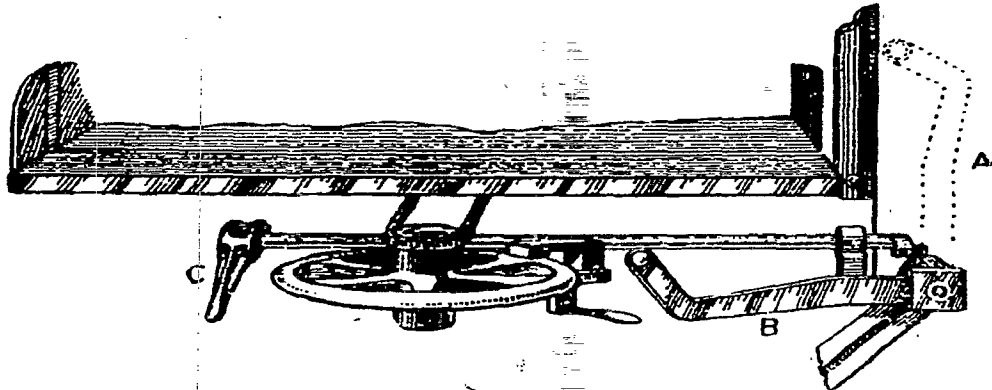
- (a) The machine is running continuously and the operator gets out of time or misjudges the descent of the knife and is caught.
- (b) The machine repeats unexpectedly because of machine defects or from lack of proper care and attention.
- (c) Someone other than the operator trips the machine by stumbling or falling against the tripping lever.
- (d) Close work such as label cutting is being performed where it is necessary to hold in position the material being cut. On such work the pile is often unstable and it is an easy matter for a hand to slip under the knife.

METHODS OF SAFEGUARDING

It is thought that the following suggestions cover the more essential features to be considered in safeguarding these machines:

- (a) The tripping lever should be so arranged and so located that it will be impossible for falling material or for other workmen to trip the machine accidentally.
- (b) A positive throw-out device should be incorporated to automatically disconnect the power when the knife bar reaches its upper limit of travel, thus making it impossible for the knife to make a second stroke until the tripping lever is pulled. On some cutters a safety bolt or pin is also inserted automatically so that the knife bar cannot start through a second revolution until the starting lever is tripped.
- (c) On a number of machines provision is made for disengaging the clutch at any point of the stroke, thereby stopping the machine instantly.

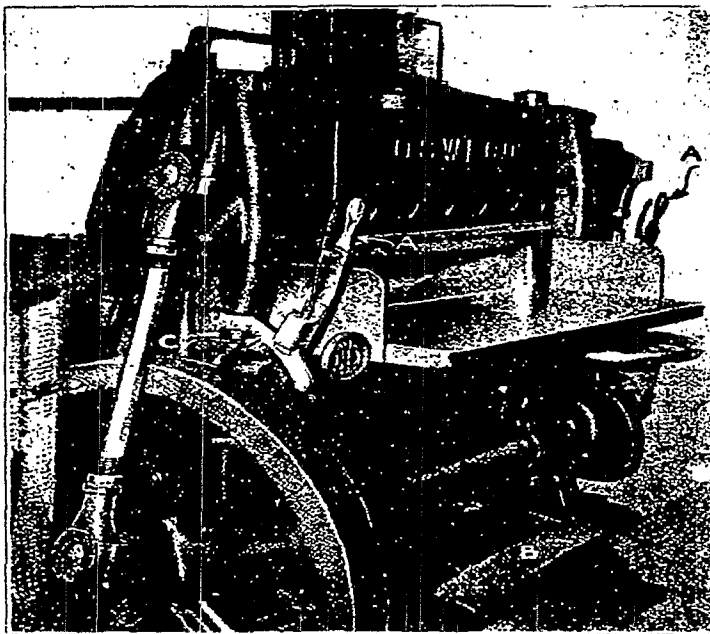
MECHANICAL TWO HAND TRIPPER



The regular tripping lever B is locked in the off position and cannot be lifted until the auxiliary handle C is pulled up, lifting the lug out of the way. (The Seybold Machine Company.)

- (d) A number of manufacturers and users have developed two hand tripping devices which are designed to keep both of the operator's hands from under the knife while the cut is being made.

MECHANICAL TWO HAND TRIP



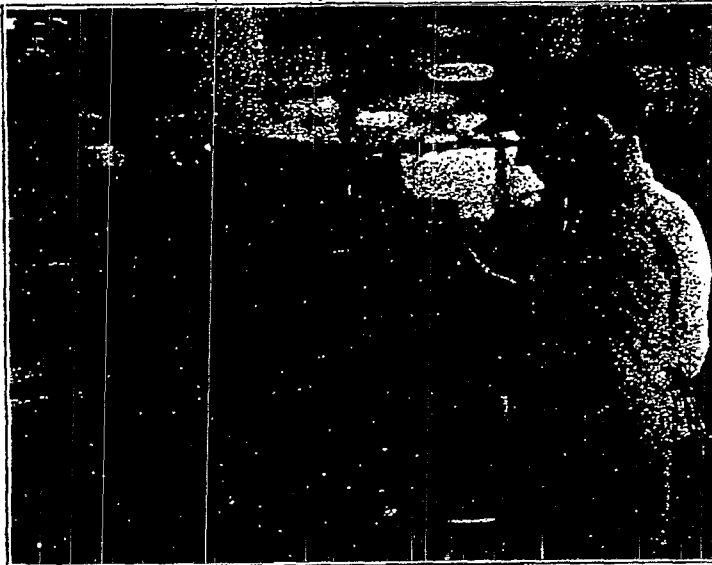
The latches of the two starting levers A are locked in a slot cut in the steel arcs, one of which is shown at C. As the two levers are rigidly connected to a common shaft it is necessary to open both latches to operate the machine. (Photograph from American Machinist.)

Devices of this kind are somewhat similar to the two-hand trip used on power presses and are very effective in eliminating accidents. In most cases these appliances are mechanical and consist of an auxiliary lever with various connections. This lever must be pulled in order that the main starting handle may in turn be tripped and cause the machine to function.

One type of two hand trip which may be used on cutters equipped with only one tripping lever consists of a rod placed under the table with a handle on one end and on the other a lug which rests on top of the main tripping lever, thus holding it in the off position. When the auxiliary handle is pulled up the lug is lifted out of the way and the trip may be operated.

Another type of two-hand trip may be applied to certain makes of cutters which are fitted with a cam arrangement connecting the tripping lever and the clutch operating mechanism. This consists of a slot cut in the cam into which a steel bar is fitted. The bar is attached to a rod terminating in a handle under the table and is held in place by a spring. It is necessary to pull the auxiliary handle to draw the bar from the cam slot before the regular starting handle can be pulled. When the cutter has completed one stroke the steel bar is forced back into the slot by the spring and the machine is locked.

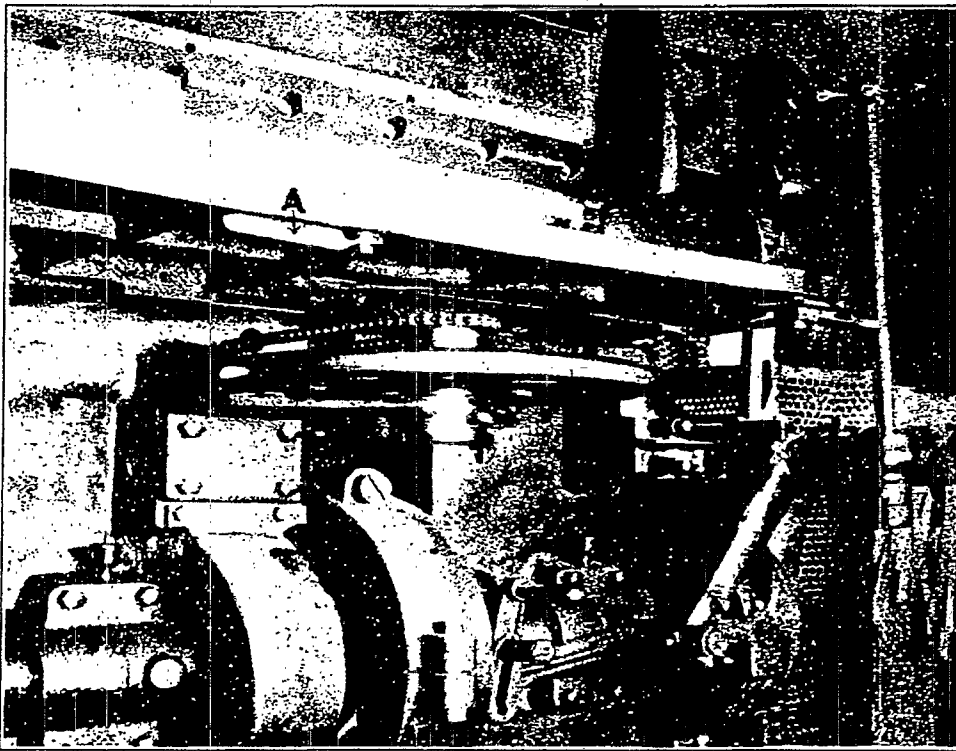
ELECTRICAL TWO HAND TRIP



The operator is shown with his right hand on the tripping lever and his left hand on the push button. The mechanical operating lever is locked in the off position and cannot function until the push button is pressed thereby releasing a catch which normally engages a notch to hold the lever in position. Details of the device are shown in the succeeding photograph which portrays a side view of the machine. (Eastman Kodak Company.)

Some makes of cutters are equipped by the manufacturer with a tripping handle on each side of the machine. In a case of this kind both levers are usually connected to a common shaft and the operation of either lever engages a clutch which drives the knife operating mechanism. This arrangement enables the operator to trip the machine from either side, depending on his position. A simple two-hand trip for such a cutter consists of two arcs formed of steel bolted to the machine frame in such a position as to hold the latches of the two regular operating levers. As the two levers are rigidly connected to a common shaft it is necessary to open both latches before the machine can operate.

MECHANICAL TWO HAND TRIP



The operator must pull lever A slightly forward, moving trip B, which allows clutch lever C to be thrown. (Yawman and Erbe Mfg. Company.)

One user has developed an electrical two-hand trip which is controlled by a push button under the table. The mechanical operating lever is locked in the off position by this arrangement and cannot be pulled unless the operator with his free hand maintains pressure on the push button which by means of a solenoid releases a catch normally engaging a notch to hold the lever in position.

Accompanying photographs show typical examples of two-hand tripping devices.

- (e) Label cutting, sample cutting and similar close work probably comprise the most hazardous operations performed on these cutters. It is usually necessary to hold the material up to the knife and for this reason a two-hand trip must be rendered inoperative. It seems that so far nothing has been perfected by the builders to remove this hazard. However, a number of users have developed special holding devices to overcome the difficulty. Such a device may consist of a thin piece of wood with a handle affixed to the front face. Another type consists

BELT AND PULLEY SAFEGUARDS



Safeguards provided for belts and pulleys, flywheel and knife head connecting rod of guillotine cutter.

of a steel block with a spring clip which engages over the top of the pile to be cut and firmly holds the material in place.

A photograph of one of these holding devices is included at the end of the report.

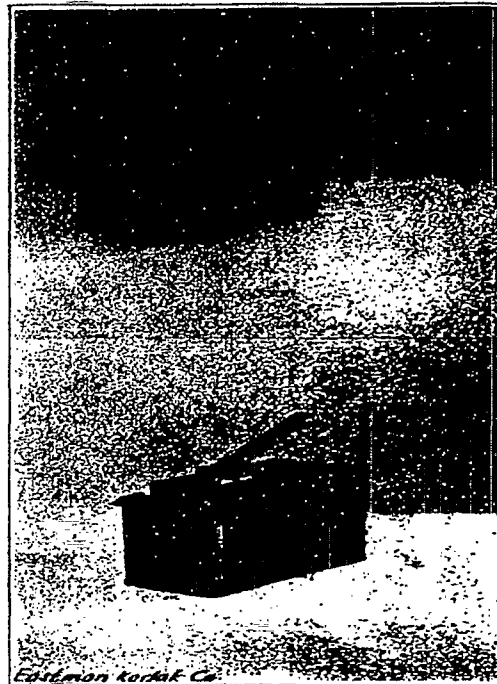
SUMMARY

In summarizing it is thought well to lay stress on the following essential points:

- (a) All paper cutters should be subjected to frequent and thorough inspections. It is especially important that the driving and clutch mechanisms be kept properly cleaned and lubricated as well as free from defective or badly worn parts. All safety devices should be inspected to see that they are in good condition and functioning properly.
- (b) A two-hand tripping device should be used under all possible conditions. It is thought that practically the only exception to this rule will be on label cutting, sample cutting and other fine work where it is necessary to hold the material in position. A number of two-hand trips have been developed by manufacturers and users and it is believed that one can be devised for almost every type of machine.

HOLDING DEVICE FOR LABEL CUTTING

Steel block with spring clip which engages over the top of the material to be cut and firmly holds the pile in place. (Eastman Kodak Company.)



- (c) When label cutting and similar fine work is performed it will be necessary in many cases to render the two-hand trip inoperative. Such blocking off should be done only by someone in authority and the operator should be provided with a holding device which may be used in place of a hand to keep the material in position. When the particular job requiring this practice is completed, the use of the two-hand trip should be resumed immediately.

It is thought that observance of these regulations, together with reasonable care on the part of the operator will greatly reduce accidents on guillotine paper cutters.

(Motion made, seconded and carried that the report be adopted.)

REPORT OF THE COMMITTEE ON FLYWHEELS

E. G. TOLSTED, CHAIRMAN

This committee was appointed at the first meeting after the last Congress. We looked around and tried to get enough men interested in flywheels to form a good committee, but we have not yet succeeded in filling it out. We have a few members, but not enough to cover the country as we should, and to cover the field of work that we have.

I should like to get the names of some more men who are interested in this flywheel proposition. We would also like to have reports from you as to flywheel accidents that you hear of during the coming year. Accurate information regarding flywheel accidents is hard to obtain. If you don't feel competent to make a report upon flywheel accidents, at least send us the preliminary information regarding the accident and we will come back at you with questions that will help you in making a good report.

(Motion made, seconded and carried that the report be accepted.)

REPORTS ON SAFETY CODES

CHAIRMAN FONDA

You are all familiar with the safety code work that is being done by various committees under the general auspices of the American Engineering Standards Committee. While our representatives on these committees are representatives of the whole Council, practically all of them are members of the Engineering Section; their work is of particular interest to the Engineering Section and will therefore be reported at this time.

The Council has taken a leading part in safety code work. The Power Press Code, formulated under our sponsorship, has been completed and approved. Under our sponsorship also are the codes on Construction Work, Paper and Pulp Mills, Textiles, and Forging, which have been discussed at this Congress in the corresponding industrial sectional meetings. It should also be noted that our Chief Engineer, the Secretary of this Section, has continued as chairman of the Safety Code Correlating Committee which is the general steering committee on the entire safety code program.

On some of the remaining codes on which we are represented, there will be no report because the work has hardly gotten under way. Let us now receive reports on those codes on which good progress has been made.

LIGHTNING PROTECTION CODE

JOHN R. BROWNELL

This committee has divided itself into sections to consider different phases of the lightning hazard. There have been several such sectional meetings since the last Congress, but no general committee meeting. The subject that has received the greatest attention has been lightning rod protection. After several revisions, that portion is now practically ready to go to the general committee and will, I think, be submitted and passed upon, probably within the next two or three months.

INDUSTRIAL SANITATION CODE

L. D. BURLINGAME

A tentative draft of the Industrial Sanitation Code has been prepared, and forwarded to the representatives in July, 1923.

This report is divided into ten parts, including 34 sections, as follows:

Part I: Sec. 1.—Scope, Application and Compliance. Sec. 2.—Definitions.

Part II: Sec. 3.—The Plant.

Part III: Sec. 4.—Ventilation. Sec. 5.—Removal of Injurious Substances by Ventilation. (See Existing Code.)

Part IV: Sec. 6.—Lighting. Sec. 7.—Glare and Brightness. Sec. 8.—Exit and Emergency Lighting. Sec. 9.—Illumination Values Desirable for Different Classes of Work. Sec. 10.—Maintenance. (See existing Code.)

Part V: Sec. 11.—Toilet Facilities. Sec. 12.—Chemical Closets. Sec. 13.—Privies. Sec. 14.—Urinals. Sec. 15.—Heating, Ventilation and Lighting of Water Closets, Chemical Closets, and Privies.

Part VI: Sec. 16.—Washing Facilities. Sec. 17.—Drinking Water. Sec. 18.—Dressing Facilities. Sec. 19.—Retiring Rooms for Females. Sec. 20.—Maintenance of Personal Service Facilities.

Part VII: Sec. 21.—First Aid. Sec. 22.—Lunch Rooms. Sec. 23.—Protective Clothing and Equipment. Sec. 24.—Females, Seats and Lifting Weights.

Part VIII: Sec. 25.—Removal of Dust. Sec. 26.—Removal of Fumes, Gases and Vapors. Sec. 27.—Hazardous Processes. Sec. 28.—Work in Compressed Air.

Part IX: Sec. 29.—Establishments Manufacturing or Preparing Food-stuffs, Confections and Candy. Sec. 30.—Erection, Repair or Demolition of Buildings. Sec. 31.—Labor Camps and Cannery Camps.

Part X: Sec. 32.—Periodic Physical Examinations. Sec. 33.—Industrial Sickness Records. Sec. 34.—Industrial Health and Medical Service.

The above was sent out for the purpose of securing criticisms and comments by members, and it is understood that within a short time the organization of the sectional committee will be more fully effected, when a meeting will be called to consider the numerous suggestions and comments which have been received, and which have been tabulated.

The proposed code is comprehensive in its scope and it is believed should be of value in unifying the practices in all sections of the country.

SCHOOL LIGHTING CODE

G. H. STICKNEY

The committee has been organized under the regular procedure of the American Engineering Standards Committee, with the scope of adopting an American Engineering Standard Code of School Lighting under the sponsorship of the Illuminating Engineering Society and the American Institute of Architects. There are representatives on the sectional committee of about twenty different organizations, which are understood to include all of those having any major interest in the School Lighting Code.

The chairman of the sectional committee is Mr. L. B. Marks, consulting engineer of New York City, who is also chairman of the Illuminating Engineering Society's committee on lighting legislation.

The general movement to prescribe lighting for school rooms, started a number of years ago, and in 1918, the Illuminating Engineering Society issued such a code for the purpose of advising school authorities and forming a basis for legal regulations. This code was adopted by the New York State Board of Education and applied to schools receiving state aid. It also formed the foundation of the school lighting regulations for the State of Wisconsin, which were issued in 1921.

The practice has advanced so rapidly in the last six years that the 1918 code was found to require complete revision. In order to facilitate action, it is planned by the Illuminating Engineering Society to submit the code formally to the sectional committee when it is in a form satisfactory to that society. A preliminary draft of the code is now in definite form and has already been subject to a number of more or less extensive changes to meet criticisms received from various authorities. The code has been informally before the sectional committee, the members of which have made some comment.

With the consent of the sectional committee, a draft was printed and submitted to the convention of the Illuminating Engineering Society at Lake George, N. Y., September 24 to 28, 1923. No important criticisms were brought out at this meeting, so that it would appear probable that the code will be formally submitted to the sectional committee at an early date for whatever action the committee may see fit to take.

Preceded by an explanatory introduction and definitions, the code consists of three sections, namely: Rules, why fulfillment of the rules is important and how to comply with the rules.

The rules consist of a general requirement that buildings be so designed as to provide ample and suitable natural illumination in class, study and similar rooms during the hours of normal daylight, and further, that all parts of the school plant shall be provided with suitable illumination, natural or artificial, to insure safety and freedom from eye-strain whenever in use. Eight detail rules specify the specific requirements for securing and maintaining this condition, the title of these rules are as follows:

1. Intensity of Illumination.
2. Avoidance of Glare.
3. Distribution of Artificial Light.
4. Color and Finish of Interiors.
5. Switching and Controlling Apparatus.
6. Exit and Emergency Lighting.
7. Inspection and Maintenance.
8. Black Boards.

This section thus comprises a specification in engineering form, on which legislative or departmental regulations may be based. As far as practicable, it prescribes results to be obtained so as to leave as wide a latitude as possible regarding the means to be employed. In some cases, however, it has been found necessary to specify the means.

The fulfillment of rules section discusses the rules explaining why good lighting is important and why various features are specified.

The how to comply with the rules section explains and suggests means of complying with the rules, especially with regard to the present state of the art. This section contains a treatise on illuminating design, illustrated by specific problems. It warns against a number of common faults and points out practical methods of maintaining illumination conditions and preventing depreciation.

The chapter on Glare is a compilation of the best information and theory on this subject. It grades both the requirements and various purposes of the light sources in a practical way, which should prove of real assistance in eliminating this menace. The improved methods of window shading receive careful consideration under this heading.

The code as a whole, is based on a wide range of experience, both in lighting practice and lighting regulations. Not the least important is the experience in prescribing the Industrial Lighting Code, which is now an American Engineering Standard, and which has served as a foundation for the industrial lighting regulations now in force in a number of the leading industrial states, such as New York, New Jersey, Pennsylvania, Wisconsin, California.

When a few minor points still under consideration are settled, your representative believes the instrument will be the best that can be produced at this time. Recognizing that it will still be desirable to modify the code slightly from time to time with the increase in knowledge and with the advancement in the art, your representative is convinced that it is an important contribution to safety, and that it will do much to facilitate great work of preserving the eyesight of the school children of the nation.

Believing the School Lighting Code is in full harmony with the purposes of the National Safety Council, your representative recommends it as worthy of your hearty support.

DUST EXPLOSION HAZARDS COMMITTEE OF THE NATIONAL FIRE PROTECTIVE ASSOCIATION

H. M. NICHOLS

I am pleased to report that the Dust Explosion Hazards Committee of the National Fire Protection Association has made substantial progress in the last year. Tentative regulations for the control of explosion hazards in flour and feed mills, and the grinding and pulverizing systems for cocoa have been worked out in tentative form. These tentative regulations were submitted at the annual convention of the National Fire Protection Association in May 7 and were adopted by the association in tentative form.

In addition to the above, regulations for pulverized fuel systems were submitted with a preamble exempting power plant interests for the ensuing year in order to afford representation of these interests on the Dust Explosion Hazards Committee. Regulations covering the important subject of terminal elevator control were submitted as a progress report in order to comply with the request of the Terminal Elevator Grain Merchants Association for representation on the Dust Explosion Hazards Committee, and to secure the cooperation of the trade during the coming year.

The National Fire Protection Association took the following action on the various regulations submitted:

The regulations for sugar pulverizing, flour and feed mills and cocoa pulverizing were tentatively adopted in the convention on May 8, with the understanding that the committee would make the minor changes necessary. The pulverized fuel regulations were adopted with the preamble recommended by the committee and the elevator regulations presented as a progress report and referred back to the committee to afford an opportunity for representation by the Terminal Elevator Grain Merchants Association.

In addition to the above regulations which were submitted to the National Fire Protection Association, this committee is actively working on the following codes for industries:

1. Regulations for starch factories.
2. Regulations for installation of sulphur crushing and pulverizing systems.
3. Regulations for pulverizing metals.
4. Regulations for spice plants and coffee grinding.
5. Regulations for paper mills, woodworking plants, rubber and textile plants.

IDENTIFICATION OF PIPING SYSTEMS**H. P. WEAVER AND S. H. KERSHAW**

The Committee on Code for Identification of Piping Systems was organized October, 1921, the American Engineering Standards Committee assigning its sponsorship to the American Society of Mechanical Engineers and the National Safety Council. The personnel of the committee appears in an appendix at the end of this report.

The first year was spent in collecting data and getting into touch with the wide range of organizations whose interests will be affected by the code.

At a full committee meeting, the report of the Sub-Committee on Plan and Scope was presented, discussed, and accepted with slight modifications. This report covered the work of the period just mentioned, and may be briefly summarized as follows:

It provides for sub-committees to carry on future work in identification by color, classification, identification markings, other than colors and executive committee.

The work already done by the sub-committee on plan and scope limits the code to identification of piping systems in industrial and power plants not including pipes buried in the ground. Piping systems including the fittings, valves, and pipe coverings are defined as hollow conduit for the transport of gases, liquids, semi-liquids or plastics. A power plant is given a wide interpretation, but does not include operations performed for other purposes than the transfer of units of heat from one form into another more readily usable form.

The sub-committee during its year of work gave considerable thought to identification by colors. It had two difficulties to face. First was the impossibility of assigning a particular color to every product liable to be transported. This was met by dividing all products into five general classes as follows: safe products, extra valuable materials, dangerous materials, protective materials, and fire control equipment.

Each of these divisions is to be given a major color, and the various sub-divisions that a plan might need are to be obtained by the use of numbers, names, or the like, painted in white or black upon background of the color selected.

The second difficulty has been to find paints which would retain their colors under all conditions of service. Members of the committee with the widest experience in this matter have found it almost impossible to use paints when subjected to various fumes. Taking the present state of the art into account it was thought best to make the following tentative assignments:

Safe products	Yellow
Extra valuable materials.....	Aluminum
Dangerous materials	Black
Protective materials	Green
Fire control equipment	Red

In the future prosecution of the work it is proposed:

That the Sub-Committee on Identification of Colors make the suggestions for various colors, giving confirmatory evidence that these colors can be universally used and preparing specifications for the preparations of the paints selected.

That the Sub-Committee on Classification communicate with the representatives of the various industries obtaining from each a list of the materials piped through its plants, this data to be combined, and each then classified according to the five major classifications already selected.

That the Sub-Committee on Identification Markings Other Than Color investigate form and shape methods of identification, and make recommendation as to the most practical method of marking. Upon agreement it shall meet jointly with the Sub-Committee on Classification for the purpose of applying definite markings to the list of materials submitted by that committee.

It is further recommended that upon the completion of the Code and the dissolution of the Main Committee, a Permanent Committee be appointed by the American Engineering Standards Committee, this Permanent Committee to sit continuously, modifying the Code from time to time according to changes in requirements.

The two representatives of the National Safety Council on the Main Committee are Mr. S. H. Kershaw, of Hercules Powder Company, Wilmington, Delaware, and Mr. H. P. Weaver, of Independence Bureau, Philadelphia, Pa. They are serving on the working sub-committees of the general committee.

PERSONNEL OF SECTIONAL COMMITTEE ON CODE FOR IDENTIFICATION OF PIPING SYSTEMS

SPONSORS—

National Safety Council, The American Society of Mechanical Engineers.

CHAIRMAN—

A. S. Hebble, Southern Pacific Co., American S. S. Lines, Pier 49, North River, New York City.

SECRETARY—

I. G. Hoagland, National Automatic Sprinkler Association, 80 Maiden Lane, New York City.

<i>Organization Represented, Name and Business, Affiliation of Representative</i>	<i>Class of Representative</i>
AMERICAN GAS ASSOCIATION—	
H. E. Bates, Asst. to Chief Operating Engineer, The Peoples Gas, Light & Coke Co., Chicago, Ill.....	C
AMERICAN SOCIETY OF SAFETY ENGINEERS—	
W. J. Venning, Supervising Safety Engineer, Aetna Life Insurance Co., 100 Williams St., New York City.....	GI
AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, DEPT. OF WATER SUPPLY, GAS AND ELECTRICITY—	
H. S. Wynkoop, Electrical Engineer, Dept. of Water Supply, Gas, Electricity, Room 2300, Municipal Bldg., N. Y. City..	C
AMERICAN INSTITUTE OF CHEMICAL ENGINEERS—	
Crosby Field, National Aniline & Chemical Co., 21 Burling Slip, N. Y. City.....	P

AMERICAN SOCIETY OF REFRIGERATING ENGINEERS— F. N. Speller, Metallurgical Engineer, National Tube Co., Pittsburgh, Pa.....	C
AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS— A. K. Ohmes, Consulting Engineer, 101 Park Ave., New York City	GI
BUREAU OF STANDARDS— I. J. Fairchild, Bureau of Standards, Washington, D. C.....	GI
ASSOCIATED MFRS. OF ELECTRICAL SUPPLIES— Oscar Hoppe, American Circular Loom Co., 90 West St., N. Y. City.....	GI
COMPRESSED GAS MANUFACTURERS' ASSOCIATION— H. S. Smith, Prest-O-Lite Co., Inc., 30 East 42nd St., New York City.....	C
HEATING AND PIPING CONTRACTORS' NATIONAL ASSN.— R. A. Wolff, Wolff & Munier, Inc., 405 Lexington Ave., New York City	C
INTERNATIONAL ACETYLENE ASSOCIATION— R. E. Bruckner, United States Gage Co., 44 Beaver St., New York City	GI
NATIONAL SAFETY COUNCIL— H. P. Weaver, Independence Bureau, 137 South Fifth St., Philadelphia, Pa.....	GI
NATIONAL SAFETY COUNCIL— S. H. Kershaw, Hercules Powder Co., Wilmington, Del.....	C
NATIONAL PAINTS, OIL AND VARNISH ASSOCIATION— H. A. Gardner, Educational Bureau Scientific Section, Paint Mfrs. Assn., 1845 "B" St., N. W., Washington, D. C.....	P
NATIONAL PAINT MANUFACTURERS' ASSOCIATION— F. P. Ingalls, Chief Chemist, John W. Masury & Sons Co., 44 Jay St., Brooklyn, N. Y.....	P
NATIONAL VARNISH MANUFACTURERS' ASSOCIATION— E. J. Cole, Chief Chemist, Hilo Varnish Corporation, Marcy and Flushing Avenues, Brooklyn, N. Y.....	P
NATIONAL ASSOCIATION OF ELECTRICAL CONTRACTORS AND DEALERS— F. C. Smith, J. F. Hall-Smith Co., 320 Fifth Ave., N. Y. City..	GI
NATIONAL FIRE PROTECTION ASSOCIATION— J. C. Forsyth, Electrical Engineer, N. Y. Board of Fire Under- writers, 123 Williams St., N. Y. City.....	GI
NATIONAL ELECTRIC LIGHT ASSOCIATION— G. W. Saathoff, H. L. Doherty & Co., 24 State St., N. Y. City..	GI
NATIONAL ASSOCIATION OF STATIONARY ENGINEERS— Willis Lawrence, Interboro Rapid Transit Co., Power Station, Fifty-ninth St. and N. R., N. Y. City.....	C
NATIONAL AUTOMATIC SPRINKLER ASSOCIATION— I. G. Hoagland, National Automatic Sprinkler Association....	C
SOCIETY OF NAVAL ARCHITECTS AND MARINE ENGI- NEERS— A. S. Hebble, Superintending Engineer, Southern Pacific Co., American S. S. Lines, Pier 49, North River, N. Y. City....	C
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS— W. S. Morrison, N. Y. Edison Co., 130 E. 15th St., N. Y. City..	C
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS— Ross S. Peck, Dwight P. Robinson Co., Inc., Grand Central Palace, N. Y. City.....	C
U. S. NAVY DEPARTMENT— L. W. Bates, Project Manager, Power Plant Section, Bureau of Yards and Docks, Navy Dept., Washington, D. C.....	C
U. S. NAVY DEPARTMENT— Lieut. G. W. Nelson (CC), Bureau of Construction and Repair, U. S. Navy Dept., Washington, D. C.....	C
STATE OF NEW YORK— R. C. Taggart, New York State Department of Architecture, The Capitol, Albany, N. Y.....	C

Classification of Personnel

Producers	4
Consumers	14
General Interests.....	9

AERONAUTIC SAFETY CODE

GEORGE E. PETERSON

The work of preparing the Code was at first divided into five parts: airplane structure—design, construction and test; power plant—design, construction and test; equipment and maintenance of airplane; lighter than air craft, balloons, airships, parachutes and kites; airdromes and traffic rules, landing fields, airports, signals and qualifications of pilots. Later, this work was again subdivided so that now there are seven parts to the Code.

The section on airplane structure is divided into 16 parts as follows:

1. General Features of Design.
2. Longitudinal Stability and Balance.
3. Control Arrangements.
4. Landing Gear.
5. Accommodation of Pilot and Passenger.
6. Precaution Against Injury in Accident to Airplane.
7. Material of Construction.
8. General Requirements of Wooden Members.
9. Specific Requirements of Wooden Members.
10. Metal Parts.
11. Fire Prevention, General Requirements.
12. Fire Resistance in Airplane Construction.
13. Engine Installation.
14. Exhaust Manifold Arrangement.
15. Ignition and Other Electrical Apparatus.
16. Fire Prevention and Equipment.

This draft was circulated as widely as possible with the result that over 200 individuals had an opportunity to review and criticise the work. In the work on power plants, it was necessary to go into minute details but effort was made to lay down rigid requirements without undue hardship on the manufacturer. This section deals with engine specifications, propellers, lubrication and cooling ignition, ground test in various ways, engine mounting and general accessories, such as control and instruments.

The sub-committee on airplane structure held its last meeting at Washington on September 26. It is estimated that 90 per cent of the work is now completed.

WOODWORKING CODE

Chairman Fonda: Our representative on this committee, Mr. Regula, is not present so I will call on Dr. Chaney, chairman of the committee.

Dr. L. W. Chaney: The present situation with regard to the Woodworking Code is that a few minor changes and additions must be made to the Code, and it is hoped that it will be possible to submit it to the Engineering Standards Committee at the next meeting after the October meeting.

Two other Codes have been completed and actually approved, the Code on Mechanical Transmission of Power and the Code on Ladders for various purposes. In some cases the printing of these Codes is done by the sponsor bodies; in certain other cases the Codes have been turned over to the United States Bureau of Labor Statistics, which is publishing them as the Safety Code Series of its Bulletins, so that the U. S. Bureau

of Labor Statistics is undertaking to supply in practically unlimited quantity copies of these various Codes as they finally come to the point of approval by the American Engineering Standards Committee.

(Motion made, seconded and carried that the report be accepted.)

Chairman Fonda: I will ask Mr. Paine, the newly elected Chairman, to preside during the balance of the meeting, so that you will know who Mr. Paine is and can give him a good start on his next year's program.

ADDRESS OF CHAIRMAN-ELECT

W. S. PAINE

I want to take this occasion of thanking you for this opportunity of serving as Chairman of this Section, because I speak truthfully when I say that it is a duty and a chance really to do something. We have developed, this past year, a few researches which will be of benefit to the Council and I hope that next year we may take on four or five more. I want to emphasize the point that we don't want a "high-brow" development under the name of research, but we want a good, practical development of every problem we tackle. So I am going to ask you, if you have any specific problems with which you are laboring, to seek the Council for help on that specific problem, and I will guarantee if it is within our power we will not send you a simple photograph that was printed ten years ago and say that is the solution, but will do our best to bring the matter up to date. I make that explanation because I have seen some reports in which there are photographs which you men have reviewed nearly every year for ten years. Now let us shake ourselves from that state of lethargy and let us do some real development work. You only have to work on the color for traffic signals, and get the correspondence with various police and city officials from coast to coast, to realize how little work has been done on certain phases of public safety, and what a crying need there is for aid along these specific lines.

PRESSURE VESSELS

SAMUEL S. CASKEY, ENGINEERING DEPARTMENT, E. I. DU PONT DE NEMOURS & COMPANY, WILMINGTON, DEL.

The subject "High Pressure Vessels" as understood in this discussion deals with those vessels employed in chemical and similar processes other than steam vessels, such as boilers, steam accumulators, digesters, air pressure tanks, hydraulic apparatus, etc., for which laws have already been laid down and formulae for designing have already been authorized and compiled by many states, "The American Society of Mechanical Engineers," and other engineering societies. They are variously called in the trades autoclaves, converters, reactionary kettles, thionators, chloronators, carbonization kettles, dissolving kettles, fusion kettles, jacketed nitrators, sulphurating kettles, etc. The typical vessel I have selected is the autoclave, or closed, high pressure, high temperature, agitation vessel, carrying pressures from 60 to 1,500 lbs. and temperatures from 212° to 600°F.

Eight or ten years ago most of the designs followed English and German practice; since then the apparatus has been redesigned and built more according to American ideas. In the same time there have been built in this country about 200 different types, of which I have designed 70 or more for the company with which I am associated. In fact, during that time the advance in high pressures and high temperatures has been very marked, and it is hard to tell how rapid the demands on our ability to design and our knowledge of materials will be.

We are at present reaching pressures double this and temperatures approaching the critical temperature. The distinguishing feature of all these vessels is the combination of such advanced pressures and temperatures which set up complicated and terrific strains and I wish to tell you some of the troubles we have had in our experience in designing for efficiency and safety. You will appreciate these troubles when you learn some of the requirements of the processes.

The higher pressure vessels are nearly all closed fusion reactionary vessels and seldom have there been two of one design, some detail always varying for a special reason. Heating and cooling in these vessels is nearly always very rapid to save time in the process yet some of the processes last three to four days. One instance of terrific grief to any kind of vessel is the case we have of a reaction kettle in which at a critical point in the process and when the materials are at red heat, water is introduced to produce pressure within the vessel for decanting a very quick setting material. Imagine the expansion and contraction strains under this treatment; the control depends entirely on the operators watching the steam gauge. In many cases the reactions get beyond control and safety valves must be relied on. In other cases it is hard to get the proper heat arrangements so that there may be uniformity of heating.

Some vessels requiring low temperatures may be heated by steam jacketing. High temperature vessels must be heated by oil jacketing and vessels requiring still higher temperature may be fired directly with gas or oil, and we have still other types that must be heated to the critical pressure and critical temperature, which means that this combination of pressure and temperature is the point at which water and steam have the same properties, that is, the same weight per cubic foot and the same heat content. Another way of putting it, is that we have come to the end of our steam tables as they are used today and modern authorities differ as to their exact value. You will see that we have already arrived at a mechanical and manufacturing stage which had its inception over fifty years ago and had to do with the realm of thermodynamics. In fact we are beginning to work with a condition that is very unstable and beyond which little or nothing positive is known as yet.

At this writing we have news from England printed in the magazine *Power* of a steam plant using 3,200 lbs. pressure and 706° F. temperature.

To go deeply into the subject of design would require a great deal more time and space than we have at our command at present. The divisions and sub-divisions of the facts to be considered in designing are very numerous and we will only speak of the most important points.

GENERAL CHARACTERISTICS IN DESIGN

Our first task and first consideration were metallurgical, that is, whether the vessels should be made of cast iron, steel, or welded steel, and what quality of welding should be used.

Most European designers carried extreme fiber strains which were too high for this class of manufacture, because there is a safety factor for expansion and contraction required beyond anything allowed in the past. Seldom, if ever, do we allow strains greater than 6,000 lbs. in cast steel, 1,500 to 2,000 lbs. in cast iron. Autogenously welded vessels are permitted to carry 8,000 lbs. extreme fiber strain, but electric or acetylene work should not be used except for very moderate pressure in welding pressure-vessels because of the human element entering into the welding operation, and the greater susceptibility to corrosion of the weld.

Our second problem was to design a vessel of such shape as could economically handle the quantity of material which was to be worked, and of such shape that the greatest strength and adaptability would aid in the fabrication of the vessel.

In all of these different types and combinations of temperature and pressures, we have the difficulty of supplying proper safety valves or relief mechanisms. The standard steam and air types were inadequate at these high pressures, because while the valve would in most cases relieve at the proper pressure, it would not return to the seat until the vessel was emptied, this being due to the fact that after the valve started to discharge, we had to contend with the inertia of the discharge which required more power to return the valve to its original seating. Furthermore, the valves and pipe connections to them became clogged, and it became necessary to discharge safety valves into catch tanks in order to save valuable material. To overcome this difficulty, we introduced safety discs in tandem with the safety valves. The safety discs were made of taggers tin which were inserted between 1 inch pipe flanges located in a pipe line of tee construction at a distance of 3 feet above the autoclave cover. Due to the inaccuracies of manufacture and lack of homogenous quality in the tin, these discs were found to be uncertain but within safe limits. In one case the disc had fractured and the valve was found to be choked with material and the valve stems rusted in their bearing. The valve was cleaned and oiled and, with a new disc, was replaced on the autoclave. The difficulty in securing uniformity of strength in the taggers tin compelled us to start a series of tests which are still continuing and we are making tests of other alloys for the purpose of substituting a better material if possible. Continual surging under normal conditions, however, does not seem to effect the strength of the tin.

These discs start to stretch immediately a small amount of pressure is applied; this stretch continues until the material in the disc assumes a semi-convex shape which occurs when 75 per cent of the total fracture pressure has been applied. There is no perceptible stretch after this percentage has been reached. When the fracture pressure is reached, the disc cracks for a distance of $\frac{3}{8}$ in. across center, then turns toward edge along two lines about $\frac{1}{4}$ in. in length, making a gap in the disc which relieves the pressure.

To solve the difficulty, we have already designed two types of safety valves, neither of which was entirely successful and it is our problem to go further with this item.

The general outline of the vessel in mind is a flanged cylinder with a spherical bottom, closed with a lid also spherical and flanged, with the drive mechanism, manholes, thermometer wells, and sampling entrances that are to be accommodated and superimposed. The most difficult problem is that of making the joint between the lid and body. The material of the joints must first withstand the chemical action of the charge. It must also be tough enough to resist the pressure on the joint. The ordinary fabric and composition materials fail very often and quite often we must introduce grooves and metallic gaskets, but we are not yet able to consider this matter solved.

The fact that all drives, manholes, thermometer wells and sampling entrances must be accommodated on the lid and all joints packed makes the problem one of machine design.

All the foreign frame work on drive mechanisms was so designed that the strains from the gearing were transverse, requiring a great deal of material in the construction which even then permitted in the case of bevel gearing a toggling strain in the teeth of the gears, which in some cases raised the power consumed to double and triple. The frame work was usually of cast iron and of eye section and the gearing and other rotating parts were uncovered and improperly oiled. All this we have redesigned, placing the strains in torsion and housing all gearing with the gearing running in oil. Another foreign feature which we had to do away with was the step bearing which not only became clogged and jammed with material, but due to the corrosive action of the contents, loosened all rivets or bolts and when we attempted to weld it in place this action attacked the welding. To make up for this our upper bearing of the agitator shaft was supported in a long suspended tube reaching as far into the autoclave as was permissible. When oil was permitted at all within the autoclave, we provided means for carrying oil to it. The bushings in this bearing were sometimes cast iron, sometimes brass and sometimes graphite-filled. At the upper end was placed a double stuffing box of material depending on the heat of the process and the nature of the chemical, and many had to be water or oil jacketed.

AGITATOR

Another trouble, subject for consideration, is the agitator which at present has no system of design whatever. The energy consumed by a badly designed agitator is very great, and I might say the efficiency and the yield of any process of necessity depend on whether an agitator does the proper work or not.

The introduction of thermometer decanting and sampler tubes extending deeply into the autoclave interferes with the design of the agitator, cutting the transverse members which were often required for stability and producing the proper needing of semi-fluid material and creating proper vortex tendencies in fluid material. It is known, every material entering into mixing vessels must have its own characteristic handling by the agitator. Types of agitators are gridiron, paddle, spiral and reverse spiral, crank motion or needing arms, plow and harrow, and many propeller types, open and closed, and all of them must be suspended from the upper or lid bearing; in fact there are those in which the agitator must be raised and lowered in and out of the mass.

Our experience has taught us that in designing bolts for the head, care should be taken not to have these bolts too powerful, for the reason that in erecting the autoclave they might be pulled so tight as to strain the flanges and thereby make the joints conical. Once this happens, it is almost impossible to recover tightness.

We have learned also that when open slot holes are used in the upper flange of the vessel, they positively must be round and not square at the bottom of the slot, because in casting, shrinkage strains develop at sharp corners, and in bolting, they will gradually fatigue under repeated tightening of the bolts and rupture. In casting a vessel, it is necessary to cast it with the flange up so that the bottom will be of clean material without blow-holes, sand-holes or cold shots. Therefore, such material should be run as a header to the flange metal to make a homogeneous and perfect flange. This same applies to the lid. We have been compelled to give up casting vessels of so-called semi-steel, except in very small dimensions, for it is impossible in a large casting to keep the steel from segregating at the bottom while cooling in the mould. It invariably results in a distinct line of separation between the cast iron and the steel, and particularly in direct firing, will result in the expansion and contraction taking place in this particular line and nearly always breaking away causing damage and danger.

In all this design work we have had constantly before us a safety-first thought as a duty in this work and the object of this paper is simply to introduce to the National Safety Council the subject of this class of vessels and what we have aimed to do along safety lines.

Considering the increased requirements over usual custom and, after a discussion with all those concerned, we ordered to be followed out a definite plan of periodic inspection and report to detect weakness and forestall accident. Following out these orders, an inspector versed in this work and with proper mechanical training, was appointed to make the first inspection. For his aid, I prepared two questionnaires, one for

data to be collected, and one on which to report inspection facts. All vessels were fitted with thermo-couples and potentiometers for observation and control during operations. Test data of manufacture was stamped when possible and posters of the last inspection were attached to create confidence and establish morale. We have followed, and are still following up these inspections.

TYPICAL REPORT OF INSPECTION
INSPECTION OF PRESSURE VESSELS May 31, 1923.
DESIGN DATA

Works:	House: Building Number
Title: Autoclave No. 2	Drawing:
Manufacturer:	Date installed:
Diameter and length (inside):	3' 9" x 7'
Capacity in gallons:	320
Material and thickness of shell:	Steel 1½"
Type and efficiency of long seam:	Hammer lap-weld 75%
Size and spacing of rivet holes:	None
Type and efficiency of cir. seam:	None
Size and pitch of rivet holes:	None
Shape and thickness of cover:	Concave
Kind of material in cover:	Cast steel
Shape and thickness of bottom:	Convex 1½"
Kind of material in bottom:	Plate steel-welded
Number and diameter of bolts:	24—3" dia. nickel steel, 100,000 T. S.
Calculated bursting pressure:	2,800—55,000 x 70 x 2 x 1.5
	45
Test pressure:	950 lbs.
Working pressure:	650 lbs.
Stress in shell:	14,000 lbs. T.P. 9,750 lbs. W.P.
Stress in cover:	9,500 lbs. T.P. 6,500 lbs. W.P.
Stress in bottom:	14,000 lbs. T.P. 9,750 lbs. W.P.
Stress in bolts:	11,600 lbs. T.P. 8,000 lbs. W.P.
Kind of gaskets:	Norway Iron
Source of heat:	Gas fired
Extreme temperature:	200°C.
Remarks:	Safety discs as installed by actual trial fractures at 1,250 lbs., which would have allowed the material in vessel to reach its elastic limit.

INSPECTION OF PRESSURE VESSELS June 29, 1923.
DESIGN DATA

Works:	House: Building Number
Title: Autoclave No. 1	Drawing No.
Manufacturer:	Date installed:
Diameter and length (inside):	3' 0"—5' 9½"
Capacity in gallons:	325
Material and thickness of shell:	Cast steel 2¼"
Type and efficiency of long seam:	None
Size and spacing of rivet holes:	No rivets
Type and efficiency of cir. seam:	None
Size and pitch of rivet holes:	No rivets
Shape and thickness of cover:	Convex
Kind of material in cover:	Cast steel
Shape and thickness of bottom:	Convex
Kind of material in bottom:	Cast steel
Number and diameter of bolts:	20—3" diameter
Calculated bursting pressure:	4,800 lbs.
	36
Test pressure:	900 lbs.
Working pressure:	600 lbs.
Stress in shell:	7,200 T.P. 4,800 W.P.
Stress in cover:	7,200 T.P. 4,800 W.P.
Stress in bottom:	7,200 T.P. 4,800 W.P.
Stress in bolts (middle):	15,500 T.P. 10,200 W.P.
Stress in bolts (main):	15,000 T.P. 10,000 W.P.
Kind of gaskets:	Gas fired
Source of heat:	240°C.
Extreme temperature:	
Remarks:	

INSPECTION OF PRESSURE VESSELS

INSPECTION DATA

Works:	House: Building Number
Title: Autoclave No. 6	Drawing No.:
Manufacturer:	Date Installed:
Date of Inspection: May 31, 1923	Date of last inspection: March 31, 1923
Hydrostatic test applied:	875 lbs.
Test temperature:	95°C.
Duration of hydrostatic test:	15 min.
Description of leaks:	None (did leak slightly at manhole, stuffing box and thermometer well)
Pressure ordinarily used:	600 lbs.
Maximum working temperature:	175°C.
Size and type of safety valve:	None
Number of safety valves:	None
Location of safety valves:	
Safety valves loaded to:	
Type, size and thickness of safety disc:	Tagger's tin—diameter 1 3/8" x .010
Number of safety discs:	2
Location of safety discs:	On T-pipe leading to catch tank
Fracturing pressure of safety disc:	1,250 lbs. (50% high)
Date new safety disc was inserted:	June 2, 1923
Condition of bolts and studs:	Good
External condition of shell:	Good—as far as can be seen
Internal condition of shell:	Good
Requirements of apparatus:	Charged with neutral dye; begins at atmospheric temp.—goes to 175°C.—0 to 650 lb. pressure; hold temp. and pressure for 38 hours. Cooled down in 3 hours and discharged.
Remarks:	(S) F. P. Ernst, Supervisor
(S) M. E. Bonyun	

INSPECTION OF PRESSURE VESSELS

INSPECTION DATA

Works:	House: Building Number
Title: Autoclave No. 1	Drawing No.:
Manufacturer:	Date Installed:
Date of Inspection: June 29, 1923	Date of last inspection:
July 11, 1923	
Hydrostatic test applied:	900 lbs.
Test temperature:	120°-125°C.
Duration of hydrostatic test:	1 hour
Description of leaks:	None
Pressure ordinarily used:	600 lbs.
Maximum working temperature:	240°C.
Size and type of safety valve:	Lonergan—found loaded to 750 lbs.
Number of safety valves:	One.
Location of safety valves:	On discharge line outside of building
Safety valves loaded to:	750 lbs.
Type, diameter and thickness of safety disc:	Tagger's tin, 2 3/16" diameter, .012" thick—found broken
Number of safety discs:	One
Location of safety discs:	Between vessel and safety valve
Fracturing pressure of safety discs:	750
Date new safety disc was inserted:	July 10, 1923, Tagger's tin, .010 thick, 2 3/16" diameter
Condition of bolts and studs:	Good
External condition of shell:	Good as far as can be seen
Internal condition of shell:	Not examined
Requirements of apparatus:	Same as No. 3
Remarks:	(S) H. A. Mahr, Supervisor
(S) M. E. Bonyun	

DISCUSSION

Mr. J. I. Banash: I am glad to hear Mr. Caskey's remarks about rupturing disc for high pressures. I have recently heard of considerable work that has been carried on in the last year or so which I know will interest him. I am assured by the investigators, although I have not checked the tests, that control of high pressure can be obtained from very low pressures up to 2,000 or 3,000 pounds with an accuracy in the

neighborhood of five per cent, which is pretty fair and I am assured these discs are quite completely sheared. Any contribution in that direction from individual firms or from the Engineering Section is going to be of distinct value to industry, because we all know that poppet valve construction, while it has reached a degree of perfection suitable to some industries, is not suitable for others, owing to the inertia effects and certain other functions, such as settling of some of the material on the seats. It is very difficult to be sure that a poppet valve is going to close after it has performed its function, and if it has not been called upon to function for a number of years, we are not entirely certain it will function when called upon.

Another point was Mr. Caskey's conservative, carefully worded statement regarding how far they go with welding. I think from his viewpoint, and undoubtedly from his experience, he said just about all he wanted to at this time. My personal opinion, speaking from my fairly close contact with oxyacetylene welding, is that the technique of the art, the actual application of the process, is developing from day to day to meet conditions as they come up, and that this technique will be developed together with the improvement in the actual filler rods, so that the industry can look very hopefully toward progress from year to year and in the course of a few years the results obtained will be comparable perhaps with the difference in Mr. Caskey's work compared with what Messrs. Maxwell and Latour could not do at all and quit trying to do in their time.

With your permission, Mr. Chairman, I would like to move a vote of thanks to Mr. Caskey because this paper is in the form of an address and not a report of a committee.

(Motion seconded and carried.)

Mr. Caskey: I don't want to give anybody the impression there is any criticism on acetylene welding or electrical welding. We have stacks of equipment of that kind. It is only that queer combination of hot acid, hot material and the pressures combined with it which won't allow you to take any chances. I call electrical welding "tailoring". I have seen the most remarkable things made with acetylene welding apparatus. I saw a full crosshead made of pieces of plate, just as good as one cast from steel. It is simply that in those hot acid conditions, with the material submerged at the bottom, and half a dozen things gnawing at it, it does happen that way.

THE PRACTICABILITY OF BRONZE FOR SAFETY DISCS

Mr. Bonyun: I would like to ask Mr. Banash what the material was that he is using for the safety discs, where he is able to get a close rating on the uniformity of rupture, far in excess of what we have been able to get.

Mr. Banash: I think the disc will probably be bronze, but it will be supported and carried in such a way that when it reaches the limit of fiber stress it will shear and the results seem to show that it shears

practically in a circle for this particular construction. It has not been put on the market yet, and I hope that it will be within a very few months.

Mr. Bonyun: Bronze is an alloy of copper and won't stand up properly for an hour. We have almost discarded that except it be very heavily tinned. It seems as though tin is probably the most universal member in the face of chemical action that could be used, and therefore, if anything is used other than that I would imagine it would have to be pretty heavily tinned, especially where ammonia is used.

Mr. R. D. Center: I would like to ask, in discussing the disc versus the poppet valves, whether there seems to be some tendency to get away from the poppet valve. The disc is probably safer in many cases in the mechanical industry where you want to relieve pressure and at the same time you don't want to blow out your entire charge. There is a critical time at the high pressures where that pressure could be relieved and the danger would be past, and you could come back to a normal state, but the disc would not admit that. It seems to me a poppet valve or some self-closing valve is a little more reliant in keeping the plant safe and going on.

Mr. Caskey: Mr. Center's question is well-taken. We have designed a valve but have not reached a very creditable point. When the valve lifts and that inertia sets up, you have got to use that inertia as energy to close the valve. There is no attempt to depend entirely on the disc.

Mr. Banash: Nothing was farther from my thoughts than to substitute discs for safety valves, but as an ultimate safety device, sometimes they are extremely useful. There are certain things that have worked to help safety valves seat. For example: if they are continuously inspected and frequently operated by hand, if necessary, so that you know in the first place that they are not stopped, and in the second place that either you can slightly grind the seats together or, if one of them is semi-soft, that they are seating, that would be of considerable help. In certain devices the construction specifications call for actual mechanical mechanisms to actually lift the safety valve from its seat and let it reseat every time the machine in question is discharged.

Chairman Paine: A member of the Section has asked if it would not be a good thing for the Engineering Section to provide a certificate of membership. We discussed that in the executive committee last evening and we did not reach any definite decision, but we said we would throw it open to the section and let every one have a voice in it.

Mr. Fonda: If the Engineering Section should issue a certificate of membership, which some people seem to think would be of value, it would mean, perhaps, making a nominal charge from 50 cents to \$1.00. Some of the engineering societies make a charge of \$2.00 for the certificates issued. It is just a question of policy. We have not in the past had any reason for making any charges for membership dues or anything of the kind. This would simply be a certificate of membership issued to those who asked for it, and it would not be issued to anybody

who did not want it, and the executive committee would like to know from the membership what they think of the idea of having a membership certificate issued.

I make a motion that the Engineering Section through such committee as the chairman may appoint, look into the matter of preparing a suitable certificate of membership to be issued to members of the Engineering Section upon demand, for which a nominal charge would be made, depending upon the cost, this to be within the jurisdiction of that committee to decide.

(Motion seconded and carried.)

ADJOURNMENT.

THE ENGINEERING SECTION AND THE COUNCIL

DAVID VAN SCHAACK

(Presented at the Smoker, Wednesday Evening.)

I think it will be readily conceded by everyone seriously interested in safety that the Engineering Section of the Council, through what it is doing and through what it stands for, has come to be considered an essential factor in the Safety Movement, and should be even more so in the future.

There are at least two lines of activity in which the section has already done good work but in which it has so far only scratched the surface. One of these is the bringing together of safety engineers in all branches of industry, as well as governmental and insurance engineers, at meetings held between the annual congresses and in various parts of the country, for discussion of their more important problems. The experience and progress of a whole year cannot be compressed into an annual congress, huge as this has now come to be. Local safety councils necessarily devote their attention primarily to the more popular and "A B C" subjects. The Council's industrial sections are naturally restricted to their specific industries. It is the opportunity and the duty of the Engineering Section to fill the gap by such meetings as have been held during the past year in New York, Chicago and Detroit. I am glad to know that more meetings of this kind are planned for the coming year, and I hope that eventually such will be held in every important city, in cooperation, of course, with the local councils where such exist.

It should be unnecessary to urge every safety man within reach of one of these meetings to attend it and obtain the benefits of it whether he calls himself an engineer or not. With the simpler problems of safety practically solved and the accident prevention movement established on an economic basis the safety man will not long be considered an important factor in any live industrial organization, unless he masters the more intricate hazards of the industry which are still causing, in many instances, far greater monetary leaks than he is often willing to acknowledge.

During the last year, for instance, the National Council on Workmen's Compensation Insurance analyzed about \$9,000,000 of payments on account of accidents, and the significant development from this analysis was the fact that in many industries the accidents at the point of operation of specific machines caused from 20 to 45 per cent of the total payments.

There is not a single safety engineer who has solved all his problems. No one man can keep abreast with all scientific knowledge, and he must utilize the experience and ability of scientific experts to aid him in his endeavors to solve each important problem as it presents itself.

The second line of activity, and an even more fundamental one, is the work of your research committees on the so-called "unsolvable problems" in the accident field. Your section has done a little along this line; you ought to do a great deal more. Here is the great opportunity for real engineering ability and imagination, with the background of special information which only the specialist can be expected to have.

THE ADVANTAGE OF SPECIALIZATION

This is a day of specialists. Developments in one or another line are taking place in rapid succession, and wise is the safety man who can avail himself of these developments and secure their application to his specific problems which are not only causing his concern excessive pecuniary loss but are also bringing great suffering and much sorrow to many human beings.

You men who call yourselves electrical, mechanical, chemical and what-not engineers, who are members of the Engineering Section of the Council—you men who are often dreamers but whose dreams have the potentialities of practical value—should carefully avoid that state of lethargy, which so often stifles engineering consideration of safety, and come forth with the solution of some of these so-called "unsolvable problems", thus aiding and attracting to your clientage many of these young safety men who are struggling with specific hazards that can be solved only by minds trained in scientific methods of attacking problems.

One of your leading confreres in the engineering profession has said: "An important weakness in the mental processes of the engineer is his lack of knowledge of human nature, and worse still, his lack of sympathy with human problems." If this be true, there is no more profitable and fascinating field where you can obtain this knowledge of human nature, and develop that sympathy, than through safety engineering work, in which you can help in the elimination of hazards that are daily producing both human suffering and economic loss.

With our rapid industrial development has come a greatly increased hazard to human life and limb, and it is up to the engineering professions, which are responsible for so much of this development, to realize their equal responsibility for keeping this hazard within reasonable bounds, for preventing our industrial success from being marred by too heavy a toll of life and limb.

For instance, developments in electricity have been nothing less than marvelous, but with this harnessing of nature's energy to our use, there has come, too, a destructive force equalled only by lightning itself. No one has the key to solving the hazards of this most useful but destructive servant save the electrical engineer, who knows its various treacherous kinks. It is to him, therefore, that we look for ways and means of utilizing this energy without its becoming a rampant destructive force. With the safety of human life uppermost in his mind, the electrical specialist can develop these new electrical features so necessary to our modern mode of living and at the same time make their use practically harmless to society.

The mechanical engineer in many of our industries has replaced hand processes with mechanical appliances that are almost human, but too often he has entirely forgotten the human beings who are still exposed to the crushing teeth of open gears, the mangling rolls of pressing machines, the shearing jaws of punch presses, leaving his masterpiece only partially completed; for in these days of civilization, we can praise no engineer's work as "well done" when his design leaves his drawing-board without evidence of any thought of the man, woman or child who must be daily exposed to its dangerous moving parts.

The chemical engineer who has met practically every emergency demand in producing our drugs, our dyes, our fuels, and hundreds of our chemical substances, owes to society the distinct obligation to keep well in mind the fatalities he may prevent if he invariably seeks a method of offsetting the hazards of every newly developed poison, explosive or other dangerous product, or insists that society be educated to knowledge of the exposure encountered in the use of such chemicals. Often certain chemical are pressed into use without any precaution being taken, and the resultant menace continues until society is compelled to pass rigid laws to protect itself. The chemical engineer can, and should, greatly enhance his value to society by being in the vanguard of the safety movement.

PROBLEMS CAN BE SOLVED ONLY THROUGH COOPERATION

These considerations point a moral not only for engineers but for those of us who are not engineers but are connected with companies or organizations having engineering and other scientific departments or experts. Such experts do not call themselves safety men, but frequently they are working on problems of the highest importance to safety. We know this, if they do not. Many of the "unsolvable problems" of safety can be solved only through the cooperation of these engineers, chemists and the like.

Every company which is a member of the National Safety Council should have one or more of such men enrolled in the Engineering Section and prepared to work on its research committees. The National Fire Protection Association, not to mention others, has proved beyond a doubt the possibilities of cooperative engineering research, and your section should follow its example. But it can do so only with the help of

members of the Council in enlisting the assistance of their technical staffs. I understand that membership in the Engineering Section is open, as it should be, not only to safety engineers but to any qualified engineer associated with a member company. In other words, the section furnishes the means for complete mobilization of the scientific talent included in all membership of the Council. If even a small part of this talent, of these latent energies, can be effectively organized through the Engineering Section, the possibilities for greater safety literally stagger the imagination. It is unbelievable that there is any problem of safety, no matter how intricate, which cannot be solved by the scientific brains of this country—the brains which in every field of industrial development have set a standard for the world.

In closing may I bring to all of you Dexter S. Kimball's "Challenge:" "The problem of universal well-being offers a challenge and a call to duty that the engineer may not refuse. The primary conditions and responsibility for universal well-being now rest upon his shoulders, and the engineer does not like to be concerned with a half-finished 'job.' There is good reason to believe he will do his share of work in attaining the ultimate results desired. Already there are significant signs that he has accepted this duty. . . . Unless we can in some manner change our industrial system so that we can more nearly attain universal well-being and distribute the fruits of our country more equitably, we have no reason for believing that our civilization shall endure, and its bones will surely strew the shores of time with those of the great civilizations that have preceded us."

Joint Sessions

**Health Service Section and American Association of Industrial
Physicians and Surgeons**

October 2 and 3, 1923

DR. C. E. FORD

President, American Association of Industrial Physicians and Surgeons

DR. RALPH ELLIOTT

Chairman, Health Service Section, National Safety Council

TUESDAY MORNING SESSION

CHAIRMAN FORD: I have great pleasure in introducing Dr. Russell Hibbs of New York.

SURGERY OF THE SPINE

RUSSELL A. HIBBS, M.D., NEW YORK CITY

Until recent years there has been very little surgery done upon the spine, except for disease or injury to the cord, laminectomy. In 1910 some work was begun at the Orthopedic Hospital in New York City for the treatment of tuberculosis of the spine and for scoliosis. The study incident to the perfection of this operative technique led quite naturally to a study of the development of the column and better knowledge of its evolution to meet the needs of the biped posture, of the irregularities incident to this evolutionary change, a better knowledge of the shape and size of individual vertebrae, their articulation with each other, and the relationship of the whole column to body weight and movement.

This anatomical work was done with Doctor Huntington at the College of Physicians and Surgeons, and the clinical, x-ray and operative studies at the Orthopedic Hospital.

It very soon became evident that the development irregularities of the spine, especially at the lumbosacral juncture, which had long been known to anatomists and studied in anatomical specimens in museums, had a very practical relationship to pain and disability in the living subject and were therefore of interest to the surgeon.

It is not my purpose in the time at my disposal to consider all of the developmental irregularities of the column, but those about the lumbosacral juncture and pertaining chiefly to the fifth lumbar and the first sacral vertebrae and the angle at which they articulate.

The most frequent of these irregularities is an attempt at sacralization of the fifth lumbar expressed by a development of one or both transverse processes forming an articulation with the sacrum. The same irregularity is also sometimes seen in the spinous processes of the fifth lumbar.

The angle at which the lumbar spine articulate with the sacral varies, as determined by the dissection of some sixty subjects, and is from 90 to 140 degrees. The sheering force exerted at this juncture is met by a development of the body of the first sacral or not, as the case may be. As the angle approaches 90 degrees, there is no more adequate provision for this force, other things being equal, than a development of the first sacral body to meet it. When this posture does not occur, there is very definite strain at this juncture, and it always gives pain, especially to those engaged in laborious occupations.

The irregularities of the planes of the facets of the articulation of the lateral processes of the fifth lumbar and first sacral have a very important bearing on the stability of this articulation.

Failure of the development of the first sacral arch is of frequent occurrence, and impairs the ligamentous stability. A case of failure of development of both pedicles of the fifth lumbar and one with failure of development of the pedicles of the first sacral have come to operation.

As has been indicated, the most frequent of these irregularities seen is an imperfect sacralization of the fifth lumbar, expressed by development of the transverse processes on that vertebra so that it forms articulation with the sacrum on either one or both sides. This would appear to be an attempt on the part of nature to include the fifth lumbar in the sacrum in such cases. These cases always give symptoms of low back pain and of sciatic pain, especially as people grow older. Contact of two or more spinous processes has been found in many cases, sometimes associated with other abnormalities and at other times not.

SYMPTOMS

The symptoms of all these developmental irregularities in the spine rarely occur until ossification approximates completeness, when the bones lose their capacity to accommodate themselves to these strains. I-ray evidence is positive in these cases of imperfect sacralization, in those of the exaggerated lumbosacral angle, those with contact of the spinous processes and those with imperfect development of the first sacral arch, but not so in those cases with failure of development of the pedicle of the fifth and first sacral. It is cases of this class that have made up, in my judgment, those considered to have disturbances of the sacro-iliac joint, so-called relaxation. I think such a condition is very rare, and if it exists, it is doubtful if there are any symptoms associated with it. It must be borne in mind that there is in all normal people a degree of movement in sacro-iliac joints, and it is undoubtedly true that this degree of mobility may vary considerably without producing symptoms. The fact that patients with low back pain get relief from wearing belts and supports is no reliable guide to pathology, because anything which gives support in this region will give a certain amount of relief.

Here we have, however, the suggestion for treatment of this class of cases. It is safe to say that anything which disturbs the integrity of the vertebral articulation, whether disease, injury or inflammation, disturbs its usefulness to body weight and movement, and as long as there is mobility in such articulations, there will be a greater or less degree of pain and distress associated with it. It would, therefore, appear to be wise to eliminate motion in such disabled articulations by fusing the bones that participate in their formation, and this can be safely and easily done by the fusion operation so successfully used in the treatment of vertebral tuberculosis, scoliosis and fracture herein referred to.

I will now cite briefly the history of some patients illustrating the varieties of developmental defects referred to.

D. M., a man, 33 years of age, five years before operation had a severe strain in his back from lifting a heavy weight, with a "giving-way" sensation in his low back. Otherwise he was a perfectly healthy man. A question of compensation was involved in his case. For the previous two years he had been unable to assume an erect posture without crutches, thus taking his trunk weight from his lumbosacral juncture. A lateral x-ray picture of his lumbosacral juncture showed a lumbosacral angle of 90 degrees. Operation was done to fuse his fifth lumbar to his first sacral, thus transferring his lumbosacral juncture to the fourth and fifth lumbar, a perfectly stable articulation. At operation it was found that he had a gross abnormality of movement of the fifth lumbar, with a defective body of the first sacral. His relief has been complete.

Miss V. I., aged 44 years, was seen in consultation for symptoms of low back pain and pain of a sciatic character down the left leg. A diagnosis of arthritis of the hip had previously been made. A most careful search was made for the cause of her pain from various points of view, and none could be found. An x-ray picture showed her to have an imperfect sacralization of the fifth lumbar on the left side. In talking with this woman it was found that she had been collector of a weak back and had since young adult life avoided those things which necessitated back strain. At operation it was found that she had not only the condition above referred to, but a development of the spinous process of the fifth lumbar, so that it was one and three-fourths inches wide, making contact with the fourth above and the first sacral below. Operation was done to completely sacralize the fifth by fusing it to the first sacral, thus transferring her lumbosacral juncture to the fourth and fifth, and her relief was complete.

Mrs. C. N., aged 38 years, was seen in consultation for a severe sciatica, following a fall two years previously. This was without the most interesting cases I have seen. She was a perfectly healthy woman in every way, with no pathology that could be found to explain this pain. X-ray both anterior-posterior and lateral of the lumbosacral juncture showed no abnormality except a tilting to the left side of the fifth lumbar to a marked degree. Her symptoms were so distressing and our knowledge of the cause so slight that an exploratory operation was advised, thinking that some abnormality might be present which the x-ray did not reveal, because it must be remembered in the study of all cases of disease

or injury of the vertebrae, that the x-ray does not give complete knowledge. At operation there was found abnormal articulations of the lateral processes of the fourth and fifth lumbar and the fifth lumbar and first sacral vertebrae. They were of the antero-posterior type rather than lateral. The right lamina of the fourth lumbar was shortened and the lateral portion displaced downward so as to impinge upon the upper surface of the laminae of the fifth, the interlaminae space being obliterated on the right. What appeared to be the laminae of the first sacral on the left was present but nothing corresponding to it on the right. What appeared to be the lamina on the right of the second sacral continued proximally and articulated with the fifth lumbar to the antero-posterior articulation, leaving a wide defect between the fifth lumbar and the sacrum on the left. There was markedly exaggerated mobility between the fifth lumbar and the sacrum on the right of a slipping character, approximately one-fourth inch in respiration. The operative findings in this case were described to Doctor Huntington, the College anatomist, who interpreted this as being an absence of the development of the pedicle of the first sacral on the right side.

Miss L. G., aged 18 years, was among the most interesting cases which I have seen. A young girl having recently finished her graduation from college and about to sail for Europe, was seen in consultation with the family physician because of a mild degree of backache, with no obvious cause. The only thing obtained by examination was an exaggerated lordosis. X-ray of lumbosacral juncture laterally showed a slipping forward of the body of the fifth lumbar on the sacrum of three-fourths of an inch. The interpretation on this picture was that she had had a fracture. After the most careful search, however, no fracture or injury could be found. At operation it was found that the arch of the fifth lumbar was completely detached from the pedicle on both sides with marked angulation antero-posteriorly at this point. The proximal ends of the pedicle could not be reached at operation. Fusion was made of the third, fourth and fifth lumbar and the first sacral, thus transferring the lumbosacral juncture to the second and third lumbar. It was thought at operation that she had had a fracture of the pedicle, and the displacement forward of the body of the fifth was so great that it could not be reached. Again these findings were submitted to Professor Huntington, who interpreted them as being not a fracture of the pedicle of the fifth lumbar, but failure of development of that pedicle, a condition not infrequently seen by anatomists.

Miss C. A., aged 24 years, came to the hospital complaining of very severe pain in her lumbosacral region which has increased in severity during the past three years, and which was increased by the erect posture or bending backwards. She was otherwise a perfectly healthy woman. After very careful examination, the x-ray showed contact between the spinous process of the third and fourth lumbar vertebrae. At operation half of the spinous process of the third and half of the spinous process of the fourth were removed, with complete relief. This class of case is of fairly frequent occurrence.

V. L., a man, 31 years of age, was seen on account of pain in his back, of increasing severity for the past five years. He gave a history of having fallen from a tree at the age of twelve. His pain was not severe but during the past years had been constant when in an upright posture. He was a strong, well-built, muscular, active man. No cause could be found for his pain until a lateral x-ray of his lumbosacral juncture revealed a slipping forward of the fifth lumbar, both in its relation to the first sacral and to the fourth lumbar, with contact between the spinous processes of the third and fourth lumbar. Operation confirmed the x-ray findings, and that he had a fracture of the pedicle of the fifth lumbar, probably at the time of the injury in early life. In any case, the proximal end of the pedicle was found and fusion was made of the third, fourth and fifth lumbar to the sacrum. Complete relief was obtained.

G. W., aged 30 years, was thrown from a bicycle three years previously, sustaining a fracture of the right femur. He was treated in the Presbyterian Hospital and got a most excellent result; he resumed his occupation of driving a truck. Upon beginning work, he began to have backache in the lower spine and found it difficult to continue his occupation. X-ray pictures were unsuccessful and an exploratory operation was done. At this operation the entire lumbar region was exposed, and the fifth lumbar was found to have been fractured and the neural arches on both sides were ununited. Fusion was done from the second lumbar to the first sacral and relief was complete. This case illustrates again the fact that x-ray is not trustworthy in determining fractures of the laminae. I have operated on one other case with an ununited fracture of the lamina of the fourth lumbar on the left side of fifteen years' duration.

It is evident from the foregoing that anything, whether disease, injury or developmental defect which impairs the articulation of the vertebrae, changes the normal function of the joint so that as long as they have mobility they give symptoms. It is obvious, therefore, that the logical thing to do in such cases is to eliminate mobility by fusing the bones which participate in the formation of this changed articulation.

The sacro-iliac relaxation we have all been busy about, and I have yet to see a single case of relaxation that gave symptoms. I have seen a great many people that I diagnosed as having relaxation. I relieved them by putting on support, and therefore, concluding the sacro-iliac joint was relaxed. Now that won't work. As a matter of fact, all of our sacro-iliac have a very definite degree of mobility, and should have. It is conceivable that sometimes following childbirth there may be relaxation of sacro-iliac joint that might be giving some disturbance. I haven't seen it, but it is conceivable, but I think the sacro-iliac is responsive no more and no less to injury and disease than any other joint in the human body—perhaps less.

There is no injury of its very stable ligaments. The ligaments as integrals of the sacro-iliac joint are probably the best in the human body, and I think we have got to give up loose diagnosis of people having pain

in their back as having sacro-iliac joints. Strapping them gives them relief, all sorts of braces give them relief, but we have got to start our study and find out definitely what is the matter with them.

All these cases which I have shown you are people who have been treated for years and years for sacro-iliac relaxation. All the talk you hear about slipping back dislocated sacro-iliac joints, I think is loose talk. It is like my assistant who examined this man and cured him. He slipped something back, and we noted this experience I have been trying to tell you about. We would have said he had a slipped sacro-iliac joint, and we put it back. I don't think we know what we are doing when we manipulate these people on a theory that is unsound, and I think as we study this region of the human body more and more, it will become clearer to you, and we will get rid of that almost universal error, in my judgment.

CAN SICK-BENEFIT ASSOCIATIONS PROFITABLY ENGAGE IN DISEASE PREVENTION WORK?

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There are in this country hundreds of organizations of industrial employees for financial protection against protracted illness. They operate usually with the cooperation and oftentimes with the financial assistance of the corporation which employs their membership. In many instances, a majority, and sometimes a very large majority of the employees of a company contribute to the fund for sickness insurance. The work of most of these associations consist of the collection of dues from members, the investment of the funds, the investigation of sickness claims and the payment of benefits in accordance with the constitution and by-laws of the society. In certain instances these associations have established reading rooms and clubs, operated employment bureaus, organized savings banks, and undertaken various activities of a social nature. But we do not hear of any organized and well-directed endeavors to eliminate the waste of effort and of money in paying out benefits for avoidable sickness and for preventable non-industrial accidents.

Industrial accident hazards have been greatly minimized in recent years. The achievements of the safety movement have been notable. As a business proposition it has been found better to organize for safety than to let things drift and pay unnecessary claims for industrial accidents. Nevertheless, may not an opportunity for handsome profits to a sickness insurance organization exist in this hitherto unexploited field? It is not our desire to attempt to assert that this is so, but merely raise the question, and to present what facts we can that bear upon the matter.

MORTALITY RATE IS DECREASING

Deaths have been postponed and the length of life correspondingly extended by the health conservation work of life insurance companies. The cost of preventing deaths, it is claimed, is much less than the

amount of the claims which would have come in had the deaths not been postponed. In 1909, the Metropolitan Life Insurance Company began a campaign to lengthen the lives of its industrial policy holders. In the years following 1909, the mortality experience of the company consistently improved, and the improvement has been much greater than in the registration area of the United States. According to the statement of the president of the company, the improvement of the company's mortality in 1920 over 1911, in excess of the improvement in the registration area at the comparable ages, 1 to 74, for the same years, constituted a saving of 23,910 lives and \$4,700,000 in death claims.

The company's campaign to prolong life consists of education of policy holders in personal hygiene by distribution of specially prepared booklets and pamphlets to teach them the fundamentals of health and the prevention of disease; by organization of a visiting nurse service to care for policy holders when ill, and incidentally to teach sanitation and hygiene; development of an industrial service bureau to cooperate with employers of labor in securing better working and living conditions for their work people; and cooperation with health and other officials of states and cities to secure adequate legislation and appropriations for the conduct of constructive and progressive health work. Incidentally, the company prepares exhibits, makes sickness and sanitary surveys, carries on "clean-up" campaigns, and attempts to supplement the activities of social and civic agencies in the improvement of health in their respective communities. Would similar activities on the part of large employee sick-benefit associations affect the morbidity rates enough to make this work profitable in dollars to them?

For the past two or three years the Public Health Service has been receiving monthly reports from a group of 27 sick-benefit associations each of which has a waiting period of seven days; that is, sick benefits begin with the eighth day of continuous disability. The associations represent several different industries and are scattered over the northern states from Maine to Illinois and Wisconsin. They all pay benefits for essentially the same list of illnesses, venereal diseases and certain other conditions being uniformly excluded.

In 1921, the lowest sickness frequency rate in this group of 27 associations was 48 cases per 1,000 persons; the highest was 349 cases per 1,000 persons. In 1922 the lowest rate was 56 cases per 1,000 persons; the highest rate was 568 per 1,000 persons. The variation is exceedingly wide. However, the association having the very high rate of 349 cases per 1,000 members in 1921 and 568 cases per 1,000 persons in 1922 probably should be excluded from present consideration owing to certain unusual provisions which tend to exaggerate the real sickness rate. With this association eliminated, and the next highest rate taken as the upper limit of the range in rates, we find a variation from 48 to 174 cases per 1,000 persons in 1921 and from 56 to 213 cases per 1,000 members in 1922, or a range of 360 per cent in 1921 and 380 per cent in 1922.

SEX AND AGE ARE RECKONING FACTORS

There are, of course, a number of factors which might be expected to influence to a certain extent the indicated sickness rate of any fund. The sex and age composition of the membership of an association are factors to reckon with as well as the working conditions in the various establishments included, and the sanitary situation in the homes and communities represented. Other considerations are the economic status of the members of the funds and of their families, the extent and efficiency of medical and hospital service provided by the establishments or by the funds, the specific regulations governing the payment of the benefits other than those relating to the waiting period and to the duration of benefits, and the local practices that may effect the administration of the funds. The amount of the cash benefit paid by the different associations is also a matter which may influence the size of the indicated rate. Furthermore, the nationalities or racial stocks composing the membership of the different societies, marital status, especially if the proportion of married women is large in the association, the extent of adjustment to the working environment as measured by the number of years in the company's service may all be factors of sufficient importance properly to include in any sort of detailed morbidity study.

It would advance the purposes of the present inquiry if some of these factors could be eliminated by knowing the extent of variation in sickness rates among different employee groups when they all work in the same industry, live in the same general locality, and are governed by the same policy of administration of the funds. Fortunately, there are now available the morbidity statistics of two sick-benefit associations which meet these requirements. In the city of Flint, Michigan, is an industrial mutual association with thousands of members, representing the personnel of nearly all of the large factories in the automobile industry located there. In the neighboring city of Pontiac is another sick-benefit association with a membership composed of employees of all the larger plants in that city, most of which manufacture either automobiles or automobile parts and accessories. The Pontiac association is a child of the Flint idea; the two organizations have an almost identical constitution and set of by-laws. The managing secretary of the Pontiac association was trained in the Flint society. In short, the conditions generally in the two associations appear to be so much alike that it is believed the sickness rates for the plants in Pontiac are comparable with the rates in Flint after deducting from the rates of both associations all cases of rheumatism about which the rules of the two associations differ.

FREQUENCY RATES

The highest sickness frequency rate in the two associations is 151 cases per 1,000 persons per year in a plant at Flint, and the lowest sickness incidence rate is 62 cases per 1,000 persons per annum in a plant at Pontiac. The highest rate is thus nearly $2\frac{1}{2}$ times the magnitude of the lowest rate; to be exact, the range of variation is 243 per cent.

These rates are on an annual basis, but they represent the morbidity of two years, the years 1921 and 1922. Being two year averages, these rates should be more stable than figures for a single year. Nor do small numbers explain the variation, for in the plant having the highest rate the average number belonging to the association in the two years under consideration was nearly 400 persons; and in the plant having the lowest rate, the average membership was 338. The number of persons considered is thus large enough for the calculation of significant rates.

Of course, we need to know how much of the variation was due to differences in the sex and age composition of the membership of the various groups under consideration, for we have found from the tabulation of certain morbidity data that the frequency of cases of disability lasting one week or longer averages 50 per cent more among women than among men, and that the frequency of sickness lasting a week or longer is more than twice as great among males in the age group 55-64 inclusive, as among men 25-34 years of age.

We can dismiss from consideration the question of the sex composition of the membership of the two associations for the reason that the proportion of women in either association is probably too small to affect appreciably the sickness rates of any fairly large group. The question of age composition is a little more difficult to deal with. It was found that the higher sickness rates occurred in the plants at Flint with a few exceptions, most of the Pontiac establishments appearing near the bottom of the rates. The data from the Flint association was not available in such a way as to permit the computation of sickness rates according to age groups, but the age of claimants was reported. By tabulating the sickness claims according to age groups it was found that there were more claims to the extent of 1 per cent in the Flint association at the ages 45 to 54 inclusive, than in the Pontiac society, and 4 per cent more claims at Flint in age group 55 to 64 inclusive, thus suggesting that there were relatively more people in the Flint association above age 45 than in the Pontiac group. But these percentages are not large enough to suggest any very striking differences in the age composition of the two populations. It is possible, however, that in certain establishments the age differences were more marked than this, and account to a certain extent for some of the differences in the rates. On the other hand, it is conceivable that an adjustment for age might even increase the present differences in the rates for some of the establishments. A plant having a relatively high proportion of employees in the older age groups might, on account of certain favorable circumstances, show a fairly low or even a very low sickness incidence rate. We should not assume that every difference in sickness rates will be diminished by adjusting for the age factor.

FREQUENCY OF SICKNESS VARIES

These statistics therefore, afford the interesting proposition that even under conditions which are similar in many respects, the frequency of sickness may vary considerably. What, then, are the causes of these wide variations?

It is unfortunate that we cannot proceed further with the analysis of the statistics of the Flint and Pontiac associations. If we had additional data we could measure the influence of each of the important factors affecting sickness; sex, age, nationality, occupation, department of the plant, number of years employed in the establishment, marital status, etc. Having evaluated the importance of each factor, we could adjust the rates in any given group for these several factors, and thus come to know some of the fundamental causes of the variations. However, when all the factors not directly subject to control such as sex, age, nationality, etc. have been taken into consideration, it would seem from the wide differences in the crude rates that there would still be considerable latitude for the effective operation of organized endeavor to preserve health and prevent disease. The range in rates, however, affords no very definite idea of the amount of possible pecuniary profit to a sick-benefit society which may carry on a campaign for the conservation of the health of its members. Associations doubtless would like to know what the actual possibilities are for profit.

EACH ASSOCIATION IS SEPARATE PROBLEM

Each association obviously constitutes a separate problem in this regard. The size of the association has to be considered. The cost of prevention doubtless would vary greatly, depending upon such circumstances as whether facilities for medical service along preventive lines are already available in the community or whether a new organization would have to be built from the ground up.

To take a specific problem, let us see what some of the possibilities for profit are in the Flint society. In the two years under consideration the average number of calendar days of disability per case at Pontiac was 25.4 days. This figure includes the waiting period of five secular days. In the Flint association the average duration of cases was 34.6 days or a difference of 9.2 calendar days per case in favor of Pontiac. Now if the handicap of an older age distribution at Flint could be overcome by a closer follow-up of cases to see that every disabled member was being cared for so as to shorten as much as possible the duration of his incapacitation so that the average duration of cases at Flint could be reduced to the rate experienced by the Pontiac association, the savings in sickness benefits at the rate of \$9 per week would amount to \$22,448 per annum. (9.2 calendar days means \$11.79 in sickness benefits at the rate of \$9 per week. The average annual number of new cases at Flint based on the experience of 1921 and 1922 is 1,904 which when multiplied by \$11.79 gives \$22,448.16.) This saving does not contemplate the prevention of a single case; it is based entirely on shortening the duration of disease.

The prevention of illness obviously is more difficult than the prevention of industrial accidents, for the causes are more perplexing, and oftentimes much more difficult to control even when they are known. But these surely are not valid reasons for giving up all attempts at finding a solution of the difficulties.

Now if, in addition to a plan for assisting the disabled member to obtain the right sort of care and treatment for his particular ailment, associations desire to go into the preventive side of health conservation work, what diseases and conditions should they attempt to prevent? Since this presentation is entirely from the point of view of cold dollars and cents and purposely excludes humanitarian motives and considerations, we shall say that the diseases to be prevented are those which cost the society the largest amount of money. From this standpoint an association should not devote too much time to the study and prevention of the contagious and infectious diseases such as smallpox, diphtheria, typhoid fever, measles, etc., because in non-epidemic years, judging by the experience of the Flint and Pontiac associations, these diseases cause only about six per cent of the total cases and about six or seven per cent of the total number of disability days for which sick-benefits have to be paid. Neither is the prospect for handsome financial returns very alluring in the case of prevention of breakdowns of the circulatory system and diseases of the genito-urinary system and annexa, for in the Pontiac association these diseases taken altogether accounted for only five per cent of total cases and seven per cent of total days of disability, and in the Flint association for eight per cent of total cases and eleven per cent of total days lost. Nor would diseases of the nervous system and organs of special sense (eyes, ears) be the proper field for specialization since this disease group was responsible for only about five per cent of all the cases and for five per cent of the time lost. Similarly, diseases of the skin show about the same proportion of morbidity. Combine all these groups of diseases which have just been mentioned, and the sum of the time lost from them all is only 25 per cent of the total number of disability days to be paid for.

RESPIRATORY GROUP IS MOST SERIOUS

But there was one disease group which caused 37 per cent of the cases and 34 per cent of the total disability days in the Pontiac organization, and was responsible for 38 per cent of all the cases and 34 per cent of the time lost in the Flint society; and another disease group accounted for about 20 per cent of the expenditures for sickness benefits, these groups being the respiratory and digestive groups respectively. The respiratory group includes influenza and grippe, pulmonary tuberculosis, and diseases of the pharynx. The digestive group as considered here is the same as in the International List of the Causes of Sickness and Death except for the deduction of diseases of the pharynx.

Combined, these ailments caused more than half of all the cases occurring, and more than 50 per cent of the total days for which benefits were paid. In diseases of the respiratory and digestive systems it would therefore be profitable to concentrate preventive endeavor. But what specific diseases should an association attempt to prevent? The seven worst offenders from the standpoint of diseases causing the largest number of days of disability per person in the Flint association are as follows: (1) influenza and grippe, (2) bronchitis, (3) ulcer and other

diseases of the stomach, (4) appendicitis, (5) tuberculosis of the lungs, (6) tonsillitis and other diseases of the pharynx, and (7) pneumonia. The experience of the Pontiac association was similar, though as much time was reported lost there from pleurisy as from pulmonary tuberculosis.

It is, of course, very difficult to estimate the number of cases of illness that can be prevented. However, in the present example, if preventive methods could minimize the differences in the two associations due to the ages of the members and to other possible factors that might come to light, and succeed in reducing the sickness frequency in the Flint association to the rate of the Pontiac society, the benefits saved at the rate of \$9 per week would amount to \$12,528 annually.

The difference in the frequency of cases in the two associations was 28.6 cases per 1,000 persons per annum in favor of the Pontiac society. The average membership of the Flint association was 16,773 which, multiplied by the rate of 28.6 gives 480 cases at Flint in excess of the Pontiac rate. The average duration of benefits at Pontiac was 2.9 weeks which at \$9 per week cost \$26.10. A saving of 480 cases per year at \$26.10 per case would mean \$12,528 saved in sickness benefits.

This would be in addition to the saving of \$22,448 calculated as possible through cutting down the duration of incapacitation to the rate experienced at Pontiac. The total saving in disability benefits to the Flint association would therefore be approximately \$35,000 annually, on the assumption that preventive methods might be expected to overcome whatever handicaps exist at Flint over the Pontiac group; and achieve the lower illness frequency and severity rates of the Pontiac people. Against this sum, of course, would have to be charged the cost of the health conservation work.

THE VIENNA PLAN

An undertaking of the sort suggested to prevent sickness is not altogether an untried experiment. Doubtless some of you are familiar with the plan in operation in the city of Vienna. Mr. Lee K. Frankel of the Metropolitan Life Insurance Company explained the Vienna plan to the Detroit Conference in 1913. According to Mr. Frankel's exposition of the plan, the various sickness associations in Vienna which are organized largely along occupational lines, a few years before the World War formed a central body in Vienna known as the Federation of Sickness Societies. To this federation was allotted the task of providing proper medical service which each constituent society paid for on a pro rata basis. Contracts with physicians and apothecaries were made by the Federation and specialists in medicine and surgery were engaged when their services were required. Every attempt was made to effect a cure at the earliest possible moment. The prophylactic and preventive side was developed, the Federation employing for this work a competent student of conditions in industry. In its efforts to determine the extent of avoidable sickness, the Federation made use of the statistical method. The diseases occurring in each establishment were tabulated and the rates studied in connection with data in regard to the hygienic conditions

of places of employment. When correlation was found between high sickness rates in a given workshop and dust-laden air, poor ventilation, or other untoward condition, the federation would send an inspector to confirm the statistical results and if the investigation proved the correctness of the data previously obtained, the federation officials would tactfully approach the employer and call his attention to the deficiencies in his establishment. It is stated that the moral suasion which the federation brought to bear on manufacturers resulted in marked improvement in the conditions of their plants. The same method, it would seem, could be used to advantage in the improvement of community sanitation where conditions are shown by correct statistical evidence to be deleterious to health.

Before launching any health conservation campaign or program of disease prevention, the society for sickness insurance needs, above all, the morbidity statistics that will define the problems and establish the goal. It is necessary to know first the extent to which a given sickness rate can be affected by health work. This can be done by adjusting such factors as sex, age, racial stock, etc., to a standard population, and determining what the rate for a given group would be if the distribution in respect to sex, age, nationality, etc., were the same as in the standard population. With this information available, it is possible to get a better idea of what should be done in any given circumstance. As an example of the advisability of such a procedure, several months ago the officials of a national sick-benefit association consulted the Public Health Service in regard to the morbidity rates of their society. It was found that their sickness frequency rate was nearly 100 per cent higher than the average sickness frequency in a group of 27 industrial mutual associations reporting to the service, the waiting period of course being the same in all cases. The age distribution of the two groups was the next investigated, and it was found that more older persons belonged to the sick-benefit association under study than ordinarily compose the membership of an industrial mutual association. Certain tabulations are now being made to find out how much of the 100 per cent excess in sickness can be accounted for by the difference in the age distribution of the two groups. If, after correcting for this factor, we still find a high sickness frequency which is not explained by the composition of the membership, it is presumed that environment, particularly the working environment or the conditions outside the working places had something to do with the causation of the excess disability. When the officials of a beneficial association are armed and equipped with morbidity facts obtained in a correct statistical analysis, a powerful argument is afforded for the correction of conditions which are believed to be reacting unfavorably upon health.

OBTAINING NECESSARY DATA

The question of obtaining the necessary data for proper statistical analysis is not particularly difficult. The records of most sick-benefit associations would have to be modified only slightly to obtain all essential information, and the present or past records of many societies could

easily be made use of for certain inquiries. The record of dues or the membership card usually show the necessary "exposure" data from which to obtain the number of years of membership by sex, age, department, etc., and the record of "closed" claims usually includes a good share of the needed facts about each case. The main difficulty consists in getting the records analyzed by someone who has had experience in the analysis of morbidity records from the standpoint of health conservation.

But the sick-benefit associations in this country, except in a few rare instances, have undertaken neither statistical inquiry nor the prevention of disease to any great extent. It has not been considered a function of the industrial mutual association to investigate and attempt to eradicate the causes of any disease which might break out among the membership. That function has generally been deferred to the public health official and to the industrial hygienist. Could not greater effort and more thought on the part of all agencies concerned be expected and therefore ultimately greater accomplishment if associations for sickness insurance made it part of their business to investigate the incidents of disease and to study the conditions that affect the frequency and severity of illness?

Unfortunately, we have no outstanding demonstration in this country of what can be accomplished from a program of this sort. It would be in the nature of a venture to do it in a big way because the trail has not been blazed. Imagination and boldness would be essential qualities for the success of the experiment. It would be a speculation in the field of public health. As the subject was expressed by the president of the British Medical Association when he recently appealed for better housing and living accommodations in order to reduce the high cost of sickness and disablement, "if we have not been afraid to speculate in adventure, in arms, in trade, and in business, why should we be afraid to speculate in health?"

PREVENTION, REHABILITATION AND MEDICO-LEGAL ASPECTS OF SPRAINED BACK

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In view of the abundant literature on the subject of diseases and injuries affecting the spinal column and contiguous tissues, this paper is limited to a practical consideration of the traumatic phases of sprained back with its multiple lesions, apparent on clinical findings in the rehabilitation and hospital clinics and workmen's compensation courts.

Physical rehabilitation of industrial workers by the state is a comparatively recent experiment. The economic prospect for the necessary co-operation of the entire profession is still too remote. Morbidity statistics on the subject are either incomplete or entirely lacking. Steady progress is nevertheless being made, and information from various sources in the industrial and hospital field is gradually becoming more available.

Out of a series of several hundred so-called "labor backs" examined, reference is made to the observation and study of 456 actual sprained backs, followed to the initial surgical stage. The sprain fracture cases among those involved in sprained backs have been previously reported by the writer in a paper on "End Results of 442 Fractures of Industrial Origin," published in the April, 1921, issue of the Journal of the New Jersey Medical Society, page 116. On this particular occasion, spinal sprain fractures observed in this injury are advisedly classed as of a sprained back.

Comparing notes on similar cases of the non-compensable variety from the clinics and records of the Long Island College Hospital, and the Hospital for the Ruptured and Crippled, New York City, one is singularly impressed with the idea that this group of patients, seeking nothing but relief from pain and suffering, is actually more disabled than the objective clinical symptoms would warrant in the usual examination. Occasional negative X-ray and laboratory findings often contribute to the uncertainty unless one is on his guard and examinations are repeated.

In the final analysis, prognosis is the main asset of the compensation rehabilitation scheme, which will save industry millions of dollars and return the injured workman to proper earning status.

Eliminating the neurotic and the malingerer, prognosis is all the more important in dealing with a sprained back, since there are no safety appliances thus far devised to prevent it, excepting a mechanical girdle or other orthopedic supports. As for estimate of disability in compensation and negligence cases, the prognostician is of greater value than the diagnostician, even though the latter is indispensable.

ETIOLOGICAL CONSIDERATIONS

Etiologically, most of these injuries are sustained in the course of gainful occupation requiring heavy lifting, or else caused by sudden hyper-spino-flexion by direct or indirect force. The young robust individual suffers no more pain than an acute spinal myositis, so-called strained back, would impose, in the course of several days' duration.

When the accidental force is severe, the middle-aged worker whose back is thus involved, is especially subject to complications and prolonged morbidity. When workers are permanently disabled for usual occupations, their earning power is materially diminished, and the problem is therefore more complex both medically and socially.

As these cases are seldom operated on by the open method, and as such never come to the postmortem table, more intensive clinical study is the only alternative, and prevention a paramount issue. To that end research work is now being directed by Professor Jaques C. Rushmore of the orthopedic department of the Long Island College Hospital Medical College, all other departments co-operating.

The minute pathology of the acute and chronic changes is now helpfully recalled in the muscle and ligamentous tissue tears, the capillary hemorrhage, round cell infiltration, and sero-fibrinous exudate. It is difficult to imagine the escape of injury to the nerve filaments, especially

the organs of Golgi at the tendon insertions. The muscle bellies are never reported as completely torn, but the muscle tissue contraction is soon impaired reflexly, first by stasis and later by unabsorbable fibroplastic deposits within the muscle and muscle sheaths around tendo-periosteal attachments and intervertebral spaces. The subsequent calcification and osteophyte formation restricts spinal joint excursion rendering it more painful, as impaired muscle balance favors deformity.

The gross pathology of the later stage, as evinced by laboratory and clinical findings, in the final analysis points to a chronic fibrosis and calcified deposits about the spinal column in the shape of excrescences or osteophytes.

Symptom evaluation of a fibromyositis, periarthrititis, with or without accompanying joint involvement, is not difficult excepting the latter, which presents occasional differences of opinion, principally ascribed to the various stages of osteo-arthritis.

The painfully weak back, reflex muscle spasm of superficial layers and actual rigidity of lower muscle planes, the distorted statics of normal weight-bearing, the angle of compensatory deviation at the hips in the sitting posture, the undue fatigue and the guarded gait and motions of the patient unconsciously seeking hand or elbow support while sitting and leaning up while standing, are very reliable signs, even more so than those entirely based on the degree of impaired spinal joint and muscle function. A forced mobile spine of this type is often debilitatingly painful, unlike a rigid poker back, which is not half as fatiguing and much less discomforting.

DIAGNOSIS

In the cases observed, the following structures were apparently involved:

1. The musculo-tendinous segments of the erector spinae group.
2. The tendo-periosteal attachments.
3. The ligaments and bone and joint areas of the lower dorsal, lumbar and lumbo-sacro-iliac girdle.

The latissimus dorsi was useful in evaluating tender points when the transverse, intertransverse, and interspinous muscle attachments were brought into play in the presence of a fracture of the spinous processes of the vertebrae. (This diagnostic feature is invaluable in the acute or subacute stages, if the patient is co-operating.) It was not unusual to note signs pointing to involvement of one or both sacro-iliacs, and the seldom mentioned and most often sprained lumbosacral articulation.

There was some difficulty in establishing a diagnosis where tendo-periosteal tears and joint loosening were present, though unrevealed by the X-ray until some time later as a periosteal thickening with an occasional deposit of an osteophyte which could not be discerned from those seen in chronic spinal arthritis unless similar deposits were also present higher up on the spine or elsewhere about joints.

The pathognomonic signs of acute lumbar myositis, the pain, disability, tenderness and weakness ascribed to spinal strain often becloud this affection unless a painstaking differential laboratory diagnosis is made.

Physicians treating these cases are often misled. The doctor is often chagrined to find these patients turn up in the compensation courts for formal hearing months after the accident with corroborative diagnosis of sprain fractures of one or more transverse or spinous processes of the lumbar vertebrae, a chronic fibromyositis often extending to the perineurium of a sciatic nerve, and presenting all the earmarks of tangible chronic disability.

These errors not only contribute to the undoing of self-supporting citizens, but have the psychological effect of promoting malingering while the employer and carrier are unduly penalized by defraying costs for long periods of temporary disability, and a substantial expense for permanent partial or total disability.

It is therefore strongly recommended to treat all these cases as serious spinal injuries until every element of doubt is eliminated. Expert advice at this time is especially invaluable.

Before coming to court, the physician should occasionally consider the effect of ascribing to an apparent pre-existing general or focal infection all there is to the case. One must keep in mind that a spinal arthritic is not necessarily disabled until long on in years and the blood stream is constantly taking care of by-effects from focal infections unless there is traumatism and the establishment of a locus resistens minoris when the injury causes a fulminating lesion. The court usually interprets and ascribes such aggravation of a pre-existing disease to the accident.

Luxation of the lumbosacral articulation is less pronounced and may be equally undiscernible by the X-ray than that of the sacro-iliac synchondroses. This lumbosacral articulation involvement is often misjudged because of the normally varying angle at the promontory of the sacrum in different subjects, unless it is recalled that the lumbosacral joint is so placed that at best it bears the bulk of strain of the entire body weight before transmitting it to the sacro-iliac and hip joints, by virtue of guy ropes, represented by spinal muscles. This mechanical consideration is corroborated by the often overlooked crush fractures of this region.

CONTRIBUTORY CAUSES

It must be conceded that the so-called rheumatic diathesis, syphilis, tuberculosis, gonorrhea, pre-existing static weight-bearing deformity of the spine or lower extremities, or the ever-present focal infections, are singly or otherwise contributory factors to this affection. But these organic conditions must be diagnosed and treated early, or else the patients, innocently unaware, continue their work without apparent disability until the accident, when preventive medical measures are at an end.

Whether or not the physician is now dealing with a new or old lesion, aggravated by the alleged accident, in the presence of a corroborative history, liability is established. The most pathetic picture is the patient himself who in spite of compensation is a chronic invalid with all the suffering and economic waste that such affection entails.

Preventive measures are the careful selection of employees for manual labor, and painstaking examination of the individual with an emphasis

Early diagnosis and treatment in the initial surgical stage is the only economical kind of rehabilitation, which sooner or later must supplant all other physical means which experimentally precede the true or vocational rehabilitation of "sprained back."

As a preventive as well as curative measure, the element of fatigue should be guarded against by applying suitable lumbosacral-iliac supports while the patients are being treated and after they are discharged.

In the neglected or intractable cases, prognosis is of the highest value in the workmen's compensation, or otherwise called negligence cases of sprained back when such come up for final adjustment.

(Dr. Bassin showed three x-ray plates.)

WEDNESDAY MORNING SESSION

The second session was called to order at ten-fifteen o'clock at the Buffalo City Hospital by Dr. C. E. Ford.

Chairman Ford: Inasmuch as we are the guests of this institution, I want to ask Dr. Walter Goodale, the superintendent, to say a few words to us.

Dr. Walter S. Goodale: On behalf of our Board of Managers, I want to bid you a very hearty welcome. Unfortunately, our president, Dr. Edward J. Meyer, met with an accident a few days ago; he stumbled over a barbed wire fence at his farm up at the lake shore, and he is now nursing an injured ankle. Were it not for that he would be here in person.

I would like to take advantage of this occasion to make a formal request of your organization. I have the honor to be in charge of preventive medicine and hygiene in the University of Buffalo. We have recently enlarged this school so that we are now a full-fledged university in every sense of the word. Our chancellor, Dr. Samuel P. Cannon, is an educator of national repute. The school is conducted on an endowment fund of practically \$5,000,000. In medicine, we hope to keep up with the procession and be progressive and maintain our place. One of the departments that is especially anxious to make progress is the department of preventive medicine and hygiene.

Western New York, as you know, Buffalo, Niagara Falls, Tonawanda, Lancaster, and other points, are great industrial centers. We believe that the department of preventive medicine and hygiene will never be complete until it includes a section on industrial medicine. I don't mean to say that we can put industrial medicine into our regular preventive undergraduate course and turn out physicians who will be industrial physicians and surgeons; that is far from my thought. I do believe however, that the undergraduate should get some instruction in industrial medicine and that the university should offer a graduate course of industrial medicine and surgery for the physicians of Western New York. I merely want to bring this to your attention, stating that the University of Buffalo is ready to cooperate with you in the inauguration of such a venture.

I am not asking that you help us get funds or anything of that sort. The school is ready to embark, I believe, into the business of making this addition to its curriculum. We have the plant, we have the people at present who will help give the course, the local people, voluntary teachers like myself, but what we need most is advice and moral support and expert assistance, and naturally I think that your organization is in position to furnish that if you feel that you care to promote an enterprise of this sort.

I will leave the subject in Dr. Ford's hands to handle as he sees fit.

Last, but not least by any means, I want to cordially invite all the visitors to have lunch with us after you finish your program. Immediately after lunch we will have guides available so that if you care to see the institution you will be escorted about.

Chairman Ford: The industrial physicians in industry have been giving great attention to the preparation of the young man going into the field. I think we have about arrived at the conclusion that a complete course in industrial medicine is so wide and far-reaching in its influence and the ordinary medical course or the standard medical course as given by most universities is so full that until such time as we have another year in preparation for medical careers, it would be unwise to include a definite course for undergraduate students. I believe that industrial medicine is wholly a post-graduate affair.

THE ECONOMIC VIEWPOINT UPON SYPHILIS IN INDUSTRY

W. LOUIS HARTMAN, M.D., DETROIT, MICHIGAN

I have been giving this subject serious thought and obtaining statistics for the past five years, the last three of which has been very intensive, and found the expense to the industrial is appalling.

We will consider first the matter of taxation as one avenue of expense that has been treated without consideration, which when taken in a serious-minded way, the figures are colossal. Of course the first and greatest subject to be considered is safety first, or prevention of accidents. These can be materially reduced by having our employees fit, both physically and mentally. The mental attitude of the employees is far-reaching when it comes to the question of accidents. When we reduce the number of accidents we in turn make a vast reduction in our insurance rates. The greatest number of accidents that occur in the industrials are in the first two working hours and the last two working hours of the day. The accidents in the first two hours are the result of mental preoccupation or disturbance. The last two a result of fatigue. Those whose mental state is below par from disease have the highest percentage of accidents in the morning. Those in the afternoon due to physical defect.

The cost of an accident cannot wholly be computed as to what it may be in the individual case, but disorganization enters largely into the subject also. Labor turnover is another expense which often is directly chargeable to mental and physical conditions, and last, but not least, strikes and labor troubles in general.

and some faulty cerebration one should be suspicious and make repeated examinations of the eye in order to confirm his diagnosis in the early states, so as to prevent an irreparable damage that may result during the period between the onset and the time of thorough development of the disease. In these cases, if the subject is given sufficient time to focus upon a given subject, the confusion will clear up. In other words, the difference between the color conception and visual acuity of the cerebral syphilitic and of the normal person is the same as that of between a time exposure and instantaneous photography. Therefore, it can readily be seen that when a person has this defect he is capable of destroying a great deal of material, especially where fine work is being done. So it is quite essential to have the eyes of all suspects closely examined, as in a casual examination they might be able to deceive. I believe that in all cases where there is any suspicion the eye grounds should be examined.

While the oculists differ with me as to the findings, my experience has shown their importance. If an eye examination was practiced upon all of our employees we would be able to detect and make earlier diagnosis in in syphilitic brains, for, as a rule, the eyes are the first to tell the true story. A stiff or pin point pupil is one of the earliest diagnostic signs, and yet if it is not present at a given examination this condition is lacking, and perhaps, the next day in the same subject it will be very easy to discover.

When these examinations are made on all of our employess there are many other conditions of the eye not a result of syphilis, which will be detected, correction made, and visual acuity brought up to standard. Thus the fatigue and slowing up of the subject can be corrected and full efficiency obtained.

There are other conditions which will reveal themselves through an ocular examination, so that advice can be given, the proper treatment directed, and as a result the subject saved and a nasty accident possibly prevented. Periodical physical examination, conducted carefully by competent men, is the greatest "Safety First" procedure that we have, and will be a greater advance in this direction than any other thing that has been discussed so far.

The industrial heads are going to say right from the start that periodical physical examinations cannot be done, as the employees will not stand for it. I will admit the truth of this if they continue to handle the subject as it has been handled in the past by sending out pamphlets and posting notices for this procedure: it will get them nowhere, as in the first place the pamphlets will not be read; and, in the second place, the employee will become suspicious that he is being picked out as a mark and will lose his position if found with physical defects. Therefore, a campaign of personal education by a properly trained person must be carried out in a thorough and painstaking way and advise the employee that this is for his benefit as well as that of his employer. Point out to him that it is the intention of the employer to help instead of harm and, where disease is found, to see that intensive treatment is carried out to eradicate the same and bring him back to 100 per cent efficiency. When this is done

they will find that there will be very little dissension. Those that will create dissension you can rest assured, are the ones that the disease has made its inroads on, and as a result are defective mentally and should be cared for, and are more to be pitied than censored.

EMPLOYERS SHOULD BE EXAMINED

Failure in industries are by no means always to be credited to labor, be it common or expert, engaged in the manual work in the factory, but frequently the trouble lies within the executive force, as often there is found in the executive family some unsuspected member who has a diseased brain and goes on unnoticed sufficiently long to wreck the department for which he is held responsible. There are certain periods in some forms of brain degeneration which extend from six months to two years, when the mind is single tracked or like that of a child. The subject is simply accredited with being eccentric by his associates, and by the time the condition is so far advanced that they notice there is something wrong, that department may have become completely wrecked—occasionally sufficiently to ruin the whole plant. In the early stages, before considerable damage has been done, the only way such a condition can be detected is through an examination by an expert in the disease, which produces this deterioration of the brain. The general run of medical men are liable to overlook it unless they are searching for it particularly. This I have seen happen many times, and will cite cases later on. Therefore, none but a trained man in this particular line should be allowed to pass upon individuals who are responsible for any part of the industrial, whether they be executives or otherwise.

Syphilis alone costs the industries in this country countless millions of dollars every year, which could be saved if the proper precautions were taken, such as looking after the health of the employees.

In my experience many cases have come under my observation where the results were very disastrous and could have been wholly avoided if periodical examinations had been carried out by competent men. In one large manufacturing concern whose business was going to pieces from an apparently unknown cause, it was found that the production manager was suffering from paresis. Like all of these cases, he had been running along nearly a year with a single track mind, without detection. The only thing noticed by his associates was that he was working hard and had become somewhat eccentric. In another case a man with a syphilitic trouble was taken out of service, but later on was supposed to have regained his health sufficiently to be capable of managing a certain branch of the business. He did so for a time, but like a thunderbolt out of a clear sky the concern woke up to the fact that he had cost them nearly a quarter of a million for some grave errors that he had made. This man was not responsible because he had a sick mind. It was the industrial that was at fault for not keeping a close check, by way of physical examination, on this individual, when it was known that he had gone wrong before, and under the circumstances was liable to go wrong again.

some new idea or brought old ones to light, as new ideas are few and far between, the most severe criticism has come from those that are ignorant from the fact that they have not given the subject study and serious consideration, and I always feel that they need my sympathy rather than my wrath.

From my observation of the subject of syphilis and statistics gathered and the various expenses incurred by this disease my opinion would be that a billion dollars would be a very conservative estimate of what it costs annually in the United States alone.

I only hope that the heads of all of our industrials will take a few moments of their time to consider this subject in a serious manner and then ask themselves whether they are doing the right thing by their fellow men and dealing full justice to their employes as well as their stockholders if they do not try to remedy conditions. There is a remedy and that is not by advising laws or having any political affiliations in the matter, but by a campaign of personal education, and to bring this about the greatest, and to my mind the only channel, is through the industrials. Through their co-operation, 90 per cent of the battle will be won to wipe out one of the greatest curses in the world today.

DISCUSSION

Chairman Ford: One thought occurs to me to be very important, that is the double curve of accidents. Some years ago I made an analysis of some 12,000 accidents that occurred in our industry. Here is the beginning of the day, and here is a peak about nine-ten, and then there is the usual afternoon peak in the curve. What was the cause of that?

Mr. C. P. Tolman: This subject is one on which those who are especially interested will find a quantity of literature in the National Safety Council Library. It has been exhaustively studied. Dr. Ethelbert Stewart would undoubtedly answer your question very thoroughly.

Dr. Ethelbert Stewart (U. S. Commissioner of Labor Statistics): There are two elements in that. One is that a large number of our workers come from homes that are unsanitary: they sleep in rooms badly ventilated, they are muggy and thick-headed when they come to work, they live in a much worse place than the factory, and the first hour or two hours they are not in as good shape as they are after they work two hours with air and light and better conditions.

Then there is another thing that is true all along the line, and that is that industry is practically an instrument and it takes a certain length of time to get in tune with your piano, as it were, to key yourself up to the harmony of the thing.

Now we find that the old Monday morning business that we used to charge to whiskey doesn't decrease when liquor is entirely shut off. It takes about the same time to get into swing with your machine, and the accidents that occur in the morning are very largely from that source. I won't say that there isn't a morning peak, that is probably true, but in

industry as a whole it isn't a very high peak in any except the more delicate industries where it does take a little time to get yourself tuned up to your machine.

Dr. F. L. Rector: That curve of production followed the curve of accident occurrence. From the investigation that we have been able to make in our work, we have found that those two fall very closely together, and I think the explanation has been given by Commissioner Stewart, the man has to get limbered up and settled into the daily stride, and when he does that his production increases and at the same time his accident increases.

Mr. Curtis: In the 6,000 cases we handled in the compensation department of the Building Trades last year, we found that the greater part of our accidents happen about two o'clock in the afternoon and then again between ten and eleven.

Dr. Hartman: There is one point I want to bring out in regard to the early morning accidents, and that is the troubles that a great many men carry with them from home. Before they settle down and forget their home troubles they have their accidents, they haven't their minds on their work. I have had twenty-three years' experience in factories, and it has been my experience that the first two hours in the morning and the last two hours in the afternoon are the hours when accidents predominate by far.

Chairman Ford: We are especially honored this morning in having with us Sir Thomas Oliver of Newcastle-on-the-Tyne, England, but that is not really true. He is rather of the world.

SIR THOMAS SPEAKS

Sir Thomas Oliver: I just followed with interest what you were talking about—this question of the accidents in the morning and afternoon. I think Dr. Stewart has put a very true explanation before you when he told you that some of this trouble is likely due to what has taken place at home. These people who are in the factories, after their long day's work carry home with them the products of fatigue, and unless they are sleeping in well ventilated houses they do not get rid of that before the morning, so the person begins his work in the morning with the effects of fatigue of the previous day not cleared up and also with a slight toxic condition of his respiratory center. I think these two things together may be the explanation of the number of accidents in the morning.

Dr. Ford called attention to the decline in the number of accidents in the afternoon. Sometimes we find in England that the numbers are increased toward the end of the working day and at other times they are diminished. During the war I carried out some experiments in regard to this question of muscular fatigue toward the end of the day, and I found that several of the girls really had better muscular force toward the end of the day than they had in the forenoon, and I think that has been found by others as well.

Another lesser group are the "Life Extension" examinations made at the Union Health Center within the last few years of those who desired a thorough physical examination to determine their physical condition.

Finally, during the last six or seven years, a large number of examinations was made of workers, voluntarily coming for examination or treatment either to the general or special clinics.

Methods of Examination—These differed according to the purpose for which the workers were examined. The most thorough were the life extension examinations. These patients first undergo a preliminary examination by the resident physician, who takes a full history and makes the preliminary tests. They then are examined by the internist and then by those specialists to whom the internist may have referred them for special examination. As a rule, they are examined by not less than four physicians.

The methods of examination of those who apply to the internists or specialists for treatment does not differ from the general examination given for this purpose in any clinic or dispensary.

The least thorough examination is given to the candidates for admission to the union, as the purpose of this examination is simply to exclude persons suffering from active, infectious, general or special diseases. The examination is general and rapid, although whenever a chest or other condition seemed doubtful, a second examination was ordered usually. As a rule, no candidate is rejected or accepted as a non-benefit case without a subsequent, more thorough examination.

Time Spent for Each Examination—This differed according to the purpose and the character of the examination. A life extension examination usually takes no less than three-quarters of an hour by the resident physician and internist, with an additional 15 to 30 minutes by each of the other physicians. The examination of patients coming for general and special treatment lasts on an average about 15 minutes. The time for examination of an applicant ranges from 5 minutes to 15 minutes, with an average of 8 minutes. Life extension examinations are made with patients fully stripped; for all other examinations they are stripped to the waist.

Medical Examiners—The physicians connected with the Union Health Center are practitioners of five years or more experience and are paid for each period of one hour and a half the sum of \$6.00 to \$7.00.

The Workers—The patients belong to the International Ladies' Garment Workers' Union, an organization of 150,000 workers throughout the country, having a membership of about 65,000 in New York City. About 15 per cent of the 65,000 workers are Italian, 5 per cent are Russian and Polish Slaves, a small percentage Colored and American, with the bulk belonging to the Jewish race.

The Trade—The women's garment industry in New York City is housed principally in the loft district, between Second and Forty-second Streets in Manhattan, with a few hundred shops scattered on the East Side, in

Brooklyn and in Harlem. The trade is highly seasonal, there being two principal seasons of activity, one beginning in February and lasting until about May, the other beginning in August and lasting until December or January.

Until 1919 the pressers only were week workers, the rest being piece workers. A few years ago the union made a demand for a general week work in the industry, basing their claim upon the fact that piece work tended to overwork during the seasonal months, to overfatigue and other conditions which were detrimental to the health of the workers. At present most of the workers are paid weekly wages.

The Sanitary Conditions of the Shops—The women's garment industry has been regarded as one of the typical sweat-shop trades. Prior to 1910 there was a great deal of home work done and a great many of the shops were located in the East Side tenements and small lofts, in stores, as well as in basements and cellars, with inadequate light and ventilation and very deplorable sanitary conditions.

Since 1911 the Joint Board of Sanitary Control, which has been created by the protocol, has undertaken to clean up the "Augean Stables" and has established a thorough control and supervision of all the shops in the industries. Thorough semi-annual inspections are made of every shop in the industry, all shops are classified according to their sanitary character, and an intensive educational campaign is made to enforce all the standards of the board and all the rules and regulations of the Labor Law. A large number of inspections are made during each year by the inspectors of the board.

The improvement of the sanitary conditions of the shops of the industry has been very notable during the last 10 years. There has been a steady reduction of the most important sanitary defects, although a constant supervision is still necessary to enforce the minor violations which constantly occur in the shops.

Occupational Effects—There are comparatively few special factors acting unfavorably upon the health and physical condition of the workers. Owing to special conditions prevailing in the loft districts in Manhattan, there is considerable fire hazard to the workers.

There is a comparatively small number of accidents in the industry. The accidents that do occur are cuts with cutting machines, burns from pressing irons, and finger injuries by needles.

When the work was done on the piece rate basis, there was a considerable hazard because of overwork and fatigue. Under the week work basis, this has been largely eliminated.

Insufficient and improper illumination is still a cause of concern and many workers are suffering from defective eyesight due to overstrain or glare.

A considerable hazard in the industry is the faulty posture and defective seating in many branches of the trade, conditions which have been made special studies of by the board and attempts made to remedy.

There was about two per cent of the workers suffering from pulmonary affections, notably fibroid phthisis, asthma, emphysema and chronic bronchitis. This also presents a much smaller group than in former investigations.

There were 556 cases of chronic cardiac disease among the 36,510 candidates for admission to the Union.

About 15 per cent of the persons examined suffered from some form of gastro-intestinal disease, a large proportion of it of a neurotic type.

Neurasthenia is still a very prevalent disease among garment workers, to the extent of about 25 per cent. While there is much less than shown in former investigations, the percentage of neurasthenics is still too great and is partly explained by racial and economic conditions of the industry.

The other diseases that we have found quite frequent among our workers are rheumatic affections, various forms of neuritis, a considerable number of diabetes, and quite a number of endarteritis obliterans.

We have not as yet undertaken the enormous task of thoroughly studying in detail all our 50,000 records. The result of such a thorough study will undoubtedly be of greater value than our present preliminary survey.

DISCUSSION

Dr. Benedict (Birmingham): The examinations which were reported involve an enormous amount of work to be done. The work we have done along the lines of examination has been to protect the company and incidentally to make every employee feel that the fellow next to him was holding down his job and doing the amount of work he was called on to do. To date, we have examined 25,000 men. The examination is very brief. I feel that by absolutely stripping a man you get more information than you do by asking him a lot of questions. We require that every man be stripped. The interesting findings are that one per cent of the men we have examined are perfect. When I say perfect I mean as to weight, defects of vision, teeth practically perfect, no physical defect. Those men were classified as A men. The next classification was B. These formed about 73 per cent of all the men who were examined. Ten per cent were rejected. How much this will increase the efficiency of the company, of course, cannot be told, but it has certainly lessened very materially, the compensation which has to be paid on these cases, and the general health of the employees is very much better.

Malaria is something that we have to consider and which, in this part of the country, you see very little of. It is a bugbear more or less with us, and a man with acute malaria is not accepted until he is placed in the hospital and given 30 grains of quinine on three consecutive nights and then agrees to take (a written agreement) 10 grains of quinine two months. If he refuses to do this he is rejected. This is one of our problems. We have only been at it about two years, but I believe it certainly has been worth the money that has been put into it. The employee pays nothing. The company pays for every examination that is made.

THE ENDICOTT-JOHNSON MEDICAL SERVICE

DANIEL C. O'NEIL, M.D., BINGHAMTON, N. Y.

"Sickness is a hazard to which all are subjected and to which many fall victims. Those who are disabled by sickness suffer losses of time and cost of care which vary from slight burdens, easily borne, to those which fall with crushing force on individuals and families." (Report of Committee A. M. A. 1919.)

The activities and results of public health work and preventative medicine have diminished the death rate, but it is the common lot of all mortals to be subject to various physical and mental ills and to need advice and care and treatment. Up to the present, public health movements have done little to assist the individual who is actually ill; public health dealing largely with education, sanitation, control of contagion, safeguarding water and food supplies and collecting vital statistics.

The highest form of humanitarian effort is to smooth out the rough places in the life of the industrial worker. It is of far greater importance for the individual, suffering from pneumonia, or gastric ulcer, or boils, to receive adequate treatment and relief than to know the statistics that have been collected or the studies that have been made. From careful observation during the past few years I believe that a great fear is lifted, when a worker feels that he has steady employment in a suitable occupation. His next great fear is the incident of ill health to himself or his dependents. The income of the average worker shows so slight a margin over his actual living expense that a few weeks' illness, an operation, or the coming of a baby in his home, will force him into debt or cause him to seek service from charity organizations or hospitals. To allay this fear, to make their workers more contented, and free from the worries that would interfere with working efficiency, the Endicott-Johnson Corp., manufacturers of leather and shoes, employing about 16,000 workers, located in the three communities of Endicott, Johnson City and Binghamton have developed and maintained a medical service, available without cost, to all their workers and dependent members of workers' families.

HOW MEDICAL SERVICE IS RENDERED

It will be my endeavor to present to you a short sketch of the plan by which this medical service is rendered, the character of the work done and the results obtained.

Before the enactment of the Workmen's Compensation Law, a full time physician and surgeon had been employed to render first aid treatment and subsequent care to those workers who met with industrial accidents. The service rendered was satisfactory to the workers and they showed their appreciation by consulting the company doctor for various troubles not of industrial origin. The company doctor advised and treated these complaints and in a short time was burdened with work. Additional physicians were employed to meet the demand. It was only a step further for the worker to ask to bring his wife or child to the office and a small dispensary was thus established. It supplied the simple remedies required

made last year. Any medicine or appliance for the use of the patient is also dispensed, without charge, and the patient instructed in its use. If the patient requires special treatment, laboratory work, dental examination, or the opinion of a specialist, these examinations are arranged for and the patient instructed how and when to procure them.

Once each week a special period of the afternoon is set aside for a baby clinic and the wives of the workers are encouraged to bring their "well babies," who are examined, weighed and measured, and, to receive instructions in the proper care and feeding of these babies. This feature of the medical work has been enthusiastically received by the mothers and their co-operation and interest is ample reward for the effort required. No doubt much good will result from the careful observation of the development of these babies. The plan has been in operation too short a time to show marked influence on mortality statistics, but I am sure we are seeing fewer sick babies than formerly and I hope that there will be fewer deaths.

DENTISTRY, X-RAY AND CHEMICAL DEPARTMENTS MAINTAINED

Each office maintains a dental department—equipped to make dental examinations, administer treatments, fillings, do extraction, and general prophylactic work. Special dental records are made of each dental visit. No restoration of lost teeth or gold work is attempted and when such work is indicated the patient is advised to consult his private dentist.

One central X-ray outfit is used by the three stations for all X-ray work. The service is fully used for any patient requiring diagnostic or therapeutic roentgenology.

Two of the offices maintain a chemical and bacteriological laboratory. Any further laboratory service required is obtained from commercial laboratories.

All Wasserman examinations are obtained from the State Department at Albany. We do not do a routine Wasserman on each new patient but all patients with chronic conditions or in whom the diagnosis is at all obscure are given the benefit of a Wasserman test.

Each office is equipped and is treating energetically those of its patients who are suffering from syphilis. About 200 were under treatment last year. Either Salvarsan or Neo-Salvarsan is used with an intravenous preparation of mercury depending on the choice and judgment of the physician in charge of the work.

Two eye specialists with well equipped offices for examination, refractions and treatment work are available and are used by the doctors and workers to a large extent; more than two thousand refractions being made during the past year. If the worker is able to pay for the lens that is ordered, he may obtain them at cost from an optical manufacturing concern having special arrangements with the company. Any worker, having a large family and to whom procuring glasses would prove a burden, can obtain them without cost.

Among our patrons, many of whom are children and young adults, the second in order of frequency and the first in order of importance, is disease

of the nose and throat and associated structures. To meet this condition, two physicians are devoting their entire time to the care of these demands. Offices for examinations and treatment are located in the clinic and a house has been converted and equipped as an operating hospital for nose and throat cases. Tonsillectomies are done five mornings each week, the patient remaining in the hospital for about twenty-four hours following the operation. During the past year, the last six months of which the hospital was in operation, about 800 tonsillectomies were performed. The present year will show a considerable increase in this work, which is now more thoroughly organized and established.

A trained masseur is employed to administer massage and manipulation to suitable cases such as injuries to joints, fractures and paralysis.

Practically all of the major surgery is done by one surgeon who devotes his entire time to this work. As a matter of convenience patients needing surgical treatment are sent to one hospital, located near the center of the three communities. In the last year 281 major operations were performed and of course a corresponding number of minor ones.

WORKERS' FAMILIES SERVED DAY AND NIGHT

All of the three centers constantly receive calls by messenger or phone to send a doctor to the homes of the workers. The territory served by each office is apportioned and the calls are distributed so that each community may be most conveniently served. Some one of the staff in each center is on duty during the entire 24 hours and service can be obtained at any time. The workers are advised and instructed to make as few night calls as possible and in a great measure this instruction is quite faithfully carried out. However, a very small number seem to develop an urgent illness during the night hours and require immediate attention after midnight for a trouble which has existed all day.

When calling at the home of the worker the visiting doctor drives a car furnished by the company and is prepared to supply any indicated medication or do any required dressing. If suitable supplies are not at hand they may be obtained at once from the medical office.

The company maintain a staff of visiting nurses whose services are available as assistants to the doctors in the homes of the workers and who do general visiting nursing and the "follow up" work in each community. Each nurse is provided with an auto so that she is able to cover a large territory and give service in many homes each day.

The staff doctors made 75,000 visits to the homes last year and the visiting nurses made about 15,000.

Any worker or dependent having an active pulmonary tuberculosis is given the benefit of sanitarium treatment if this is advisable and acceptable to the patient. At present about seventy patients having tuberculosis are under treatment at the expense of the company. It has been proposed that at some future time the company will establish its own sanitarium for the care and treatment of this class of patients.

A home in the country, in charge of a trained nurse, has been in operation for the past five years where working girls and women, convalescing

Dr. O'Neill: There are 16,000 workers, and last year the company produced with those 16,000 workers something over 32,000,000 pairs of shoes. The cost is not against wage; it is against production. It would cost about a cent and a quarter per pair of shoes to maintain the medical service. Increased production, nor contentment, nor all the things which go with contentment in the avoidance of labor trouble and smoothness of organization are not due to the medical service; they are due to a spirit, which is something intangible, something I can't put down in figures and which wouldn't appear in statistics. I tried to carry to you the message that the whole effort of the management is to instill in the worker a spirit of partnership, a desire to do the thing that is necessary to make that worker's living conditions in the factory and at home and in the community the best that can be had.

There are two self-contained communities; two of them largely given to the city, Endicott-Johnson being centered about the shoe manufacturing industry. Perhaps a third of the workers reside in Binghamton, which is a larger city and which has only one plant.

The layettes, the photographs and other things are things which would come as a burden to poor people which it is easy for the company to furnish as a particular feature. Prophylaxis, dentistry, treatments, metal fillings without gold, porcelain and amalgam, and things of that kind can be done without a great expense and will put the worker or his children in good condition, but if it were to run into the item of plates, bridges, crowns, it would be very expensive, and I don't think \$400,000 would hardly do if you did all the work that presents itself. Then there might be an amount of dissatisfaction that might come from unsatisfactory work. There is no necessity of restoring teeth in order to put a man in reasonably good health.

FURTHER STUDIES IN MENTAL HYGIENE IN INDUSTRY

FREDERICK W. DERSHIMER, M.D., CLEVELAND, OHIO.

In a previous paper I endeavored to discuss in a general, yet not entirely impractical, way the subject of mental hygiene in industry. In that paper I asserted that every physician practices mental hygiene and that his success as a physician depends more upon his use of psychotherapy than upon any other one factor; that the development of this branch of medicine as a science carries with it the obligation to practice it in a scientific way; and that when we learn to do so we will deliver an extremely hard blow to all quackery. The logical next step appeared to be a more thorough study of some one phase of the general subject, and malingering appealed to me as being one of the most important from the viewpoint of industry. Unfortunately for this study, my connection with industry was broken several months ago. Consequently, I have not had the opportunity to study in industry the wealth of material which would have been available had this not occurred. I will, however, offer some suggestions in the hope that they may be of value in stimulating someone else to carry forward the study of this important subject.

In the past we have been in the habit of looking upon malingering as a very simple matter. A malingerer was just an employee who had deliberately determined that he would simulate a disease or injury, or magnify an injury or its results, in order to enjoy a vacation at the company's expense. It never occurred to us that malingering was a disease and the malingerer, accordingly, was classed as a criminal in our minds and considered fair game for our efforts to circumvent his scheme. This is, of course, true with regard to real malingerers, but during the past few years the psychiatrists have come to believe that malingering in this sense is rather a rare disease. White has stated that malingering is not a sufficient diagnosis. Reeve, in a personal conversation, told me that while there were, undoubtedly, malingerers in the army, the great majority of cases diagnosed as malingering proved to be hysteria. Rosanoff states that he saw but one proven case of malingering in his entire army experience, whereas he saw innumerable cases of hysteria. Other psychiatrists have similar opinions, and I am inclined to believe that in industry, also, many cases diagnosed as malingering are cases of hysteria.

DEFINITION OF HYSTERIA

It may appear that such a distinction is merely a useless play upon words. Despite the fact that Janet and others demonstrated some years ago the true nature of hysteria, many of us, lacking opportunities to keep in touch with the progress of psychiatry, may continue to look upon hysteria, also, as being a deliberate effort to deceive. This being true, it seems advisable to make an effort to understand the disease.

Janet defines it as follows: "Hysteria is a form of mental depression characterized by the retraction of the field of personal consciousness and a tendency to the dissociation and emancipation of the systems of ideas and functions that constitute personality." Such a definition is not very helpful to those who, like myself, are not psychologists. The terms used in it are without meaning to me when I am confronted with a patient. I find the same difficulty with other definitions of the disease and with the descriptions of it as well. I will, therefore, attempt to describe hysteria as I have seen it.

In making his complaint and describing his symptoms the hysterical patient usually exhibits considerable emotion. He appears to fear that the physician will not believe him, and makes every effort to impress upon him the importance and seriousness of his condition.

The history frequently discloses the fact that other members of the family have exhibited signs of nervous instability. Invariably inquiry will show that the patient has failed to adjust himself to his environment and is unhappy as a result. This maladjustment may be in connection with his home life, his work, or his broader social relations. Hysterical attacks in girls are not infrequently the result of disagreements with friends or sweethearts. Very often, though not in every case, it will be discovered that some relative or friend has had similar symptoms in the past, or that for some other reason the patient has been led to

he never stammered in giving signals. In those circumstances his superiority was established; for the time he was in supreme command of his universe.

So far one gets a picture which is far from that of an ideal man. Yet the patient was a rather high type. He was a good son, a bright, hard-working student who was making every effort to earn his own way through college and meeting with considerable success since, at the beginning of his junior year, he had about \$1,000. All things considered, he was rather a likeable chap. The paradox can be understood only when it is realized that the patient was totally unconscious of the mental mechanism underlying the stammering from which he was consciously trying hard to free himself. In a very mild degree it was another case of Dr. Jekyll and Mr. Hyde, who, after all, are present in each of us to some degree. Proof that he was unconscious of this mechanism is evidenced in the fact that the stammering began to disappear rapidly as soon as we were able to explain the cause of it. At the end of ten sessions with him it occurred very rarely. No other form of treatment was necessary.

Now to apply the facts in this case to hysteria in general. Every hysterical manifestation represents an unconscious effort on the part of the patient to attain some object which he feels is unattainable by more direct methods. In other words, he strives to compensate for a fancied inferiority. As soon as he can be shown the true mechanism of such manifestations, they disappear. Frequently even this is unnecessary. A cure can often be made by admitting that the symptom is all that the patient thinks it is, and then stimulating him to go ahead and show his ability by succeeding in spite of this handicap. This course allows him to develop a feeling of superiority which compensates for the inferiority complex which is at the root of the trouble, since a moderate success in life despite such a handicap seems to mean as much as a greater success without it.

No doubt this explanation seems far-fetched to some. Yet it is every bit as reasonable as, and rather more easily proven by experience with patients than Ehrlich's side-chain theory, on the basis of which he evolved the arsphenamine which we all accept as an invaluable addition to our therapeutic resources. Since we have to admit numerous failures in treating hysteria patients by other methods with a large resultant financial loss to industry, it would seem worth while at least to investigate this theory further.

Let us pass to more practical and definite details of prevention and treatment. As stated in Janet's definition, hysteria is a form of mental depression. Happy people do not suffer from it. It is evidence of failure on the part of the individual to adjust himself to the demands of life. Prophylaxis, then, must depend upon searching out those who are dissatisfied, finding the cause of their dissatisfaction, and aiding as far as possible in remedying it. As stated above, the fault may lie either in the individual or in the environment or in both, and some investigation of both is usually necessary. The physician in industry has an unusual

opportunity to know the conditions under which the individual works, and he has more or less opportunity in different plants to remedy bad conditions. He must usually depend upon a visiting nurse to investigate and report on home conditions, which he may be powerless to remedy. His greatest opportunity lies in treatment of the patient. In most cases the potential hysteric is such because he is failing to use the opportunities presented to live a fuller life. He can develop a hobby or skill in sports, or he can improve his philosophy of living if he will, and in many cases he will do these things if ordered to for the sake of his health by a physician.

TREATMENT OF HYSTERIA

In the treatment of hysteria the first essential is confidence in the physician. If this cannot be secured it is hopeless to continue treatment, and the patient should be referred to another physician. The case must be studied in order to determine, if possible, what the symptom represents, since it is always an ungratified wish of the patient. In industry it may be the desire for compensation, but frequently it is far more complex. The real underlying wish is likely to be for appreciation of his services, promotion, revenge on a foreman for what the patient considers injustices, sympathy from his fellow-workers or family, etc. The desire for revenge has been especially common in my brief experience, and it is essential that this emotion be relieved. In my earlier paper on this subject I described how this was done in a case where a patient had been injured when another employee pulled her chair away as she was sitting down. The employee at fault was properly reprimanded while the one injured was carefully examined and shown every courtesy within the power of the medical department.

Frequently the wishes underlying an hysteria are such that they cannot be gratified. They are incompatible with the demands of civilization. In such cases it is necessary to have some knowledge of the normal instincts of man and to trace the wish back to its basic instinct, after which it is unusually possible to find a legitimate outlet for it in some other direction. For example, sexual desire and the desire to create are manifestations of the same instinct, and the former can be greatly lessened by absorption in creative work of any type in which the patient can become interested. Such a statement may seem ridiculous, but even as conservative a man as Osler recognized the truth of it and most of us know that the person who has found work or a hobby, or both, into which he can throw himself whole-heartedly is not apt to be bothered by a sex neurosis. The two are compatible.

Drug treatment of the symptoms of hysteria is useful. It should be kept in mind, however, that drugs never cure the condition. They help by suggestion and may, indeed, cure the symptom, but the focus of mental infection, if I may use such a phrase, remains. Drugs often aid distinctly in securing the confidence of the patient, however, during the time when the source of the trouble is being sought and thus pave the way for the cure. Hygienic advice is valuable in a similar way.

Most cases diagnosed as malingering in the army proved to be hysteria on further study, and it seems probable that this is true in industry.

Hysteria is not a deliberate effort to deceive. A complicated mental mechanism underlies every case but the patient is never conscious of this mechanism, and the condition disappears rapidly as soon as he is made conscious of it.

"Find the cause and remove it," the ideal of all medicine and surgery is as important in treating hysteria as it is in treating any other condition. It is usually possible to cure hysteria, and thus no excuse remains for failure to make the effort to do so.

ADJOURNMENT.

Ice and Refrigeration Section

October 2, 1923

F. P. WALKER, Chairman

General Necessities Corporation, Detroit, Mich.

CHAIRMAN WALKER: For several years the ice industry has been interested in safety work in a more or less haphazard way. By that, I mean that there has been no co-ordination of effort on the part of the members of the industry, although a large number of men have been actively engaged in safety work. The necessity for some co-operated effort has been recognized by a number of these different individuals, and a little more than a year ago an effort was made at the last Safety Congress to form a section. At the time there were not sufficient members of this particular industry who are members of the National Safety Council to enable us to organize a section of our own, so we combined with the Taxicab and Transfer Section.

At the time of the last Congress, that section was organized and the name changed to the Taxicab and Delivery section and shortly afterwards it was recognized by the members of ice industry that we did not fit in that particular section. The president of the National Association of Ice Industries at the last annual convention appointed a committee to investigate the possibilities of organizing in some concrete way for the industry itself.

This committee has done considerable work during the past year and has succeeded in interesting about forty members of the industry in membership in the National Safety Council, so while we haven't very many of those gentlemen with us this morning, we still have the membership in the council to go ahead and organize the section.

It is hardly necessary for me to say anything about safety work to any of you gentlemen, because I naturally assume that you are all as much interested in it as I am myself, so I will not dwell on that phase of it at all.

APPOINTMENT OF NOMINATING COMMITTEE

The next thing on the program that we are required to do in order to effect an organization is to appoint a nominating committee, and I will appoint Mr. E. G. Hitt, chairman, and Mr. F. P. Hooker and Mr. C. O. Hero as the other two members of the committee.

It is necessary for us to elect a set of officers this morning and the committee will be expected to report following the discussion of the papers. The officers to be nominated are a chairman, a vice-chairman and a secretary.

There is a list here of the members up to date so far as I have been able to get them from the Council, and which the nominating committee can take to make their choice from.

We will undoubtedly be able to build up this section from the refrigerating end or a great many industries. Some of the larger automobile plants have extensive refrigerating plants. We have a representative of one of the packing companies here this morning, I believe. There is no doubt that there is plenty of room for the whole packing industry, from the refrigerating angle, in this section, because the American Society of Refrigerating Engineers are very much interested and are working with a committee at the present time on the statistical end.

So, in the course of the ensuing year, we should be able to, I would say, increase the membership of this particular section to 200. We ought to have at least 200 members.

There will be several committees to be appointed but from the fact that the annual convention of the National Association of Ice Industries will be held in Cleveland, November 13-16, at which time a large number of the members of this section will be present, it has been deemed advisable to lay-over the appointing of committees until that meeting. At that time, one afternoon will be given over to a sectional meeting on safety, at which time will come into its own in a very tangible way.

We can now proceed with the program as outlined, the first number being "Accidents in the Ice and Refrigeration Industry and Their Cost."

When this safety committee was appointed by the president of the National Association of Ice Industries, one of the members of the committee was selected for the reason that he was engaged, and has been engaged for a number of years, in the insurance field, particularly as applying to the ice industry. That man was Mr. Bruce Dodson of the Casualty Reciprocal Exchange, Kansas City, Mo. Mr. Dodson, unfortunately, is unable to be here himself, but he has sent a very capable substitute in the person of Mr. C. O. Hero, so I take great pleasure in presenting to you Mr. C. O. Hero.

ACCIDENTS IN THE ICE AND REFRIGERATION INDUSTRY AND THEIR COST

C. O. HERO, RECIPROCAL EXCHANGE, KANSAS CITY, MO.

The need for a concerted action on the part of all persons interested in the industry is most apparent, as we will indicate by the quotation of a few figures which, while approximate, are essentially correct.

Our paper will deal more particularly with the companies which would be classified as ice manufacturers, ice dealers, ice harvesters, ice cream manufacturers, creameries and dairies, beverage manufacturers and bottlers, and cold storage warehouses. This, of course, does not cover

all of the industries which use refrigerating machinery, as refrigerating machinery is used to a large degree in twenty-five to thirty prominent industries. For that reason, this paper will be more or less general in its scope.

The figures which we shall use for one of our insurance years are, to the best of our records, correct. The analysis will compare only a representative cost of personal injury accidents as reported in connection with workmen's compensation and employer's liability insurance. The reports for some few states are missing, but the figures which we shall quote are nearly complete for the entire country.

Accidents for insurance purposes are divided into classes of severity, death or permanent total disability cases being considered as of the same seriousness. The compensable cases are those which have involved time loss on the part of the injured employee for a period of about fourteen days or more. In addition to the compensation costs, a medical expense will be reported which medical expense will include first aid treatment in minor cases and the more serious work of rehabilitation in major cases.

TABULATION OF ACCIDENTS

A total of 64,863 tabulated accidents involved a total cost of \$1,323,510. The amount of actual wages expended during this same year showed a total of \$114,018,000. Approximately 1.20 per cent of the amount of wages was expended to pay losses and medical expense because of injuries suffered.

There were 83 deaths and permanent total disability cases involving a total cost of \$290,500, an average of approximately \$3,500 per case.

Serious injury involving a loss of fourteen days or more, resulted in 4,324 accidents. The total cost of the 4,324 cases was \$800,886 or approximately \$185.22 per accident.

Other accidents tabulated for the purpose of classification, in addition to the above mentioned, were 60,456. The cost of these accidents was \$232,124.

Remember that these figures do not represent one dollar of loss or expense involving teams or automobile accidents. It is safe to say that our industries suffered their proportionate number of accidents from the use of automobiles and teams.

Accidents are always explainable, if not excusable, which facts make a record important. By an analysis of the causes, the safety engineer is enabled to focus attention to that cause, bring pressure to bear through proper channels and eliminate, in a large degree, the circumstances responsible for the tremendous loss which is charged to the industry.

The following tabulation covers forty accident causes, covering a wide range:

Defective Wiring	2
Attacked by Bandit.....	3
Elevator Cable Broke.....	4
Falling Horse	6
Explosion	8

Firing Boiler	11
Wagon Struck by Railroad Train.....	12
Burn from Escaping Steam	12
Cranking Car	12
Machines (Point of Operation).....	56
Oiling Machinery	56
Runaway Team	125
Knocked Down by Horse.....	127
Wagon Passed over Foot.....	168
Sudden Start of Team.....	169
Stepping on Nail.....	206
Slivers (Wood)	225
Dog Bite	260
Slivers (Steel)	281
Pushing and Pulling.....	327
Stepped on by Horse.....	333
Automobile Accident	363
Cleaning Machinery	387
Alighting from Wagon.....	387
Fellow Employee	398
Wagon Struck by Street Car.....	560
Defective Equipment	624
Repairing Machinery	1,049
Machinery (Moving Parts)	1,294
Flying Particles	1,973
Lifting	2,023
Horse Kicks and Horse Bits	2,595
Striking Objects	3,597
Falls	4,046
Caught Between Objects.....	4,496
Hand Tools	7,223
Falling Objects	9,217
Handling Material	12,924
Slipping and Tripping	17,240
	64,863

As is seemingly natural, the most prolific cause of accidents in our industry is chargeable to the slipping and tripping hazard, wet floors, and the presence of small particles of ice in certain departments. Next in importance is the handling of materials. The use of hand tools has swelled the frequency and here is perhaps one important point which may be brought out typifying the attitude of the average employee to safety programs.

The use of ice picks and ice tongs injure drivers and distributors of ice more seriously than any of the other causes and yet it is next to impossible to impress some of the dealers with the necessity for carrying the ice pick in a shield.

Especially important is the need for proper sterilizing of cut or wound when an accident occurs. This is difficult for employees on delivery systems, since they are away from the plant and are more or less apt to ignore trivial wounds. Infectious cases develop, however, most frequently from a neglect of these seemingly trivial accidents.

We know that our industries are responsible for 64,863 accidents in one year and that they cost \$1,323,510. This loss is charged directly to the industry through insurance charges and remember this, that the companies contributing to the greatest amount of those losses suffer through an increased plant overhead, through increased insurance charges, through a reduced plant efficiency caused by an excitement in the plant and a disturbance of the general plant morale. Quite important also, is the fact of a possible reduction in the quality and quantity of production of the plant product.

We will not endeavor to discuss the accident prevention measures which could be undertaken, as these are not covered by our subject. The force of our appeal should rest upon the emphasis of the tremendous cost of accidents which occurred in our industries, and the waste which the cost occasions.

The industries covered in this paper are seasonable industries to a large extent, the peak seasons lasting for an average of three months. For this reason it is quite necessary to engage men unfamiliar sometimes with the labor they will be required to perform.

It is important that the green employee be instructed in the duties which he will take up, which work should be delegated to a shop committee or to the man in charge of the particular department where that man is employed.

The Ice Manufacturers Association in some states is doing a good work by an educational program through bulletin service. This bulletin service depicts in a graphic way the most frequent causes of accidents by use of large posters. The bulletins are posted in a conspicuous place on the walls or on a bulletin board in the plant and the thought of the employee continually directed to the Safety First problems.

EDUCATION IS MOST SUCCESSFUL METHOD

It is the experience, I believe, of the insurance companies, as a whole, that education is the most successful method of combating the increasing ratio of accidents in all industries. The insurance company furnishes protection for a certain fixed sum. This protection should be limited to the payment of losses and the settlement of claims. Competition has made it necessary, however, for the insurance carrier to cut down the high cost of accidents as a matter of self preservation. In order to do this and bring the cost of the protection down to an absolute science, actuarial and statistical bureaus were formed. These bureaus tabulate loss costs and accident causes, which facts are used for purposes of rate making.

It requires no stretch of imagination to realize that the insurance companies must obtain an adequate premium to absorb the losses that are developed in any industry. If the industries represented here are in-

interested to obtain a low insurance cost, it necessarily follows that they must co-operate to cut down the losses that accidents create. This can be done largely by co-operation with the insurance company through the inspection and safety engineering departments which are maintained. In fact, this service is fast becoming one of the most important services of the insurance carrier.

The various forms of coverage provided for the manufacturers make it possible for the individual concern to allocate costs for losses which would not otherwise be possible. It is just as important for a firm insured to cut down accidents as it is for the insurance company, as accidents receive a publicity through the press and otherwise have a far-reaching result, especially with the consuming public.

I am reminded of a very important eastern railroad, which lost considerable prestige because of a series of bad accidents which occurred within a short space of time. I believe it is true that this same result would obtain for the manufacturer who is careless of the safety and welfare of the men employed.

THE ECONOMIC SIDE OF SAFETY

The economic need for a serious consideration of the problem, we believe is fairly present and we hope that much good will have been accomplished as result of this Congress, in conserving the life and limb of the workmen in the ice and refrigerating industries.

If there is any one point which should be emphasized more than another in this paper, it is this: that if the manufacturers in the industries to which this paper is addressed, desire to reduce their workmen's compensation and employer's liability insurance costs, they must reduce the high frequency of accidents which occur. If every employer will do his part in reducing the number of accidents in his plant, all of the manufacturers will be benefited.

As the manual rates for each state for each classification are based upon a group experience as reported to the insurance departments of the respective states, it necessarily follows that each separate enterprise must do its part to improve the rate for that classification. Individual risks are penalized under a scientific rate making plan, for a high accident frequency, while the risk with a good experience and a low accident frequency enjoys a reduced rate. The base rate, however, is determined upon the experience of the whole. Remember this, that accidents cost considerable money and interfere seriously with the efficiency operation of the plant. They also create a harmful influence with the customer whom you serve.

It has been suggested that the Refrigeration Section of this Council institute a safety program during the present Congress. If this is accomplished, please feel that Bruce Dodson offers every possible assistance in the carrying out of such a program. The work begun some few months ago seems to have accomplished a good result, but let us not be satisfied until we have eliminated to a large degree the terrific toll which has been exacted through carelessness, inconsideration, or the maintenance of an unsafe condition in any of the industries in which we are interested.

Let us resolve today that we shall go back to our respective positions with this thought firmly implanted in our minds and our hearts; that we shall make our industries the most highly efficient, sanitary and the safest of any of the manufacturing enterprises.

DISCUSSION

Mr. E. G. Hitt (Chicago Ice Producers Mutual Liability Company): Our situation in Chicago is peculiar in that most of our business is done through peddlers. Out of forty members in the association only seven deliver their own ice, so our figures on delivery don't affect the true condition. Ice manufacturers figures do. We have found that pick stabs have been comparatively few but tong cuts, falls and slipping and dropping ice have been the most serious features. Our first year in operation we had seven men killed.

We keep some pretty accurate statistics on the number of employees and we have analyzed the causes of the accidents as follows:

	1921	1922	1923
January	10	53	20
February	16	11	24
March	19	26	27
April	21	11	29
May	34	32	27
June	75	68	66
July	90	51	77
August	53	66	59

The average is running almost the same in the number of accidents we are having, but the severity we have been able to decrease considerably. The total percentage of accidents we had last year ran as follows:

Ice Manufacturing.....	29.80
Ice Drivers & Helpers.....	34.67
Ice Chauffers & Helpers.....	10.35
Ice Loading & Shipping.....	4.86
Ice Cream Chauffers & Helpers.....	4.65
Ice Harvesting & Storing.....	7.39
Coal Yard Employees.....	2.11
Coal Chauffers & Helpers.....	1.05
Alterations & Additions.....	1.05
Ice Cream Manufacturing.....	1.47

Less Than 1 per cent.

Office Employees.
Ice Cream Drivers & Helpers.
Coal Drivers & Helpers.
Blacksmithing & Shoeing.
Wagon Making.
Farm Labor.
Beverages.

I say our situation in Chicago is peculiar in that most of the deliveries are made early in the morning. Our wagons are out of the loop early in the morning in hot weather.

HOW A DELIVERY ORGANIZATION CAN REDUCE ACCIDENTS TO THE PUBLIC

M. T. HANRAHAN, SUPERINTENDENT, AMERICAN RAILWAY EXPRESS COMPANY.
CHICAGO, ILL.

Every organization operating vehicles, especially in large cities, faces a difficult problem of preventing accidents involving equipment. Aside from the humane consideration, there is also the economic waste, which is a serious factor, even though there may be no loss of life or injury to the public.

The humane phase of the problem is the one in which we are most concerned, of course, and speaking for the American Railway Express Company, I am pleased to say that we are devoting a great deal of time and money in an effort to do our part in eliminating accidents.

I believe there are few if any concerns in the country operating more vehicles than our company, nor any that come into more intimate contact with the public, hence, every man in our organization feels keenly his responsibility to the public in the matter of preventing accidents.

A few years ago, or at least before the tide of motor vehicles began coming in, we had a comparatively easy task in handling our business with few if any accidents over a spread of weeks or even months but with the ever increasing flood of automobiles, together with the increase in population, in large cities, such as Chicago, where the downtown streets are so badly congested that a half-hour is sometimes consumed in going a mile, it readily can be seen that it is a huge task to keep the accidents down, let alone to prevent them.

As an illustration of this, The Chicago Safety Council, after analyzing the situation in Chicago, reports for the first six months of 1923 there were 334 street deaths in Cook County (which is really Chicago and its suburbs) and, of that number, 237 were pedestrians, 151 persons lost their lives at street intersections and 157 between intersections. And the most significant thing about this situation, to my mind, is that these deaths occurred during a period when the fullest publicity was given accident prevention by newspapers, business organizations and other agencies. The question which naturally comes to one's mind in looking over these figures—is, whether the driving public is careless or the pedestrians are inclined to take too many chances. From such study as I have been able to give the situation while a member of the street traffic committee of the Chicago Safety Council, I believe that, in the majority of cases, the pedestrians are inclined to take too many chances, on the assumption that they are entitled to the right-of-way, regardless of street conditions or circumstances. There are a great many drivers of both horse and motor vehicles who are inclined to look with scorn on the man on foot and not concede him any rights whatsoever. This wrongful

view of things on the part of both is responsible for the condition of things as we find them now, and any accident prevention work is valueless unless it can bring these two sections of the public to a common point of view.

"EVERYTHING IS SUBORDINATE TO SAFETY"

Our company for many years past has, as I previously stated, devoted considerable time and money to drilling into our drivers' and chauffeurs' minds a proper respect for the rights of the public. Our slogan has been "Everything is subordinate to Safety." While we are engaged in a business in which time is a factor, we are not unmindful of the fact that the conservation of life and limb is of paramount importance, and in every bit of publicity given the subject of preventing accidents, we have stressed the point that we would sooner miss any number of trains or any amount of express matter rather than have any man, woman or child suffer injury or death. When the vast extent of the express business is considered, the number of accidents in which our vehicles figure is comparatively small. I do not wish to burden you with a lot of figures but perhaps a word as to what we are called upon to do in an average business day in Chicago, will be illuminating in showing that it is no small job to move a huge traffic and have comparatively few accidents. Our Chicago vehicle service comprises 648 horse drawn and 306 power vehicles, including 25 tractors, with a personnel of about 2,000 men. Because Chicago is the largest railroad center in the world, there are on an average something like 400 cars of express matter in and out bound daily, the contents of which are almost all moved on the streets by vehicle service, either as local delivery, outbound collections of express or passing transfer. Our deliveries per day will average about 20,000 pieces and our collections about 49,000 pieces and our passing transfer something like 2,000 loads daily. Time, of course, is the important factor in handling this large volume of business. All our vehicles have schedules laid out for them, each vehicle having a certain amount of work to do with just so much time to do it in. As is always the case in high pressure organizations, we have to curb the natural tendency of our employes, to "step on it" as the saying goes, especially where, for some reason, like delayed trains or bad weather conditions for instance, our normal working schedules are upset.

From long experience we have found that a safe speed for motor vehicles is about twelve miles per hour and at that speed our business can be disposed of satisfactorily and with safety. Hence, one of our first steps in promoting accident prevention work was to install governors on all of our motors, and a severe penalty is meted out to any chauffeur who tampers with them with a view to getting more speed out of his truck. I can recall only one case in several years where anything of this sort occurred, and one of the things in which we take great pride is that we have never had a report or an arrest of one of our men for speeding.

However, almost all vehicles today are equipped with safety appliances which are all right so far as they go, but, to my mind, they count as nothing if the types of men who are selected to operate the vehicles are not of the highest order obtainable. This is where our company believes that Safety First principles show to the best advantage and we very often leave some of our equipment in the stables and garages rather than have it go out on the streets in charge of an incompetent chauffeur or driver. Every applicant for our service is carefully investigated, and to secure a position with us a man must be morally and physically fit. We consider that the front end or any end, for that matter, of one of our vehicles is no place for half-wits. Too many chauffeurs and drivers are operating vehicles today who are only a lap or so ahead of their keeper. They are to be found among the class who sound a warning or blow the horn and feel that their duty is ended and then proceed to run over or into whatever object comes across their path. A pedestrian naturally assumes that the driver of a vehicle will do all in his power to avoid running him down, and I have an idea that a great many accidents can be traced to the natural assumption of the man on foot that the approaching vehicle is being driven by a normal man, when as a matter of fact the driver may be full grown physically but about ten years old mentally. The careful selection of vehicle operators is something to which every business organization should give thorough consideration, and those of which I have any knowledge, are fully alive to its importance.

ACCIDENT PREVENTION KEPT FRESH IN DRIVERS' MINDS

But careful selection is by no means the end. We require of our men a probationary period of from 3 to 6 months before they are eligible for a driver's or chauffeur's position. Most of our horse drawn equipment is in charge of a conductor, who directs and supervises the driver, and we require these conductors to see to it that the driver measures up the requirements set by the company for the safety of the public.

For our motor vehicle equipment we maintain a corps of instructors, who take the prospective chauffeurs in hand and put them through a course of instruction which familiarizes the student with the mechanical features of the auto truck traffic regulations, etc., after which each candidate is given a driving test through traffic under the same conditions that our regular chauffeurs meet daily. If the prospective chauffeur passes these tests successfully, he is approved and must pass a further test by the city authorities before becoming a licensed chauffeur.

The entire vehicle force during the 24 hours in the day is supervised by a corps of inspectors and terminal dispatchers numbering nearly 100 men, all being selected for executive ability, experience and long service. A great many of these men have been with us 25 to 30 years and none have less than ten years service to their credit. These seasoned veterans are all "wedded" to the safety first idea, and keep the vehicle men under control.

By means of articles in our publication, *The Express Messenger*, by meetings at our stables and garages and, lastly, through weekly bulletins we keep fresh in the minds of our men the importance of accident prevention.

We have found also that the Motor Drivers school of the Chicago Safety Council has been of great benefit to our men in acquainting them with the traffic situation and accident prevention work presented in a manner that is interesting and instructive as well. Something of this sort should be tried with the individuals who own and drive their cars. Passenger car or owner-drivers outnumber the professional chauffeur, and a great number are woefully ignorant of even the rudimentary traffic rules. I realize, of course, that it would be difficult to interest the majority of private drivers in such instruction but it might be brought about through automobile clubs and similar agencies.

The Safety principles we have for preventing accidents are:

Keeping equipment in good mechanical condition, particularly as to brakes and other parts of the machinery which must in emergencies function properly.

SELECTION OF EMPLOYEES

Careful selection of vehicle employees, hiring only such men as are of the best type obtainable for such work. A vehicle man must have good eyesight and hearing. His manner of living must be right, otherwise he is not fit to handle a vehicle under present traffic conditions.

Education in proper operation of vehicle equipment so that in emergencies the driver will act instinctively. No driver or chauffeur should be permitted to work out his own salvation. A carefully worked out set of principles or rules must be laid and the men held strictly accountable for their observance.

Then comes ample supervision to see that what time and effort spent in preparing vehicle men is not wasted. We consider this a most important feature in all of our operations.

The necessity for such precautions is reflected in the casualty figures published from time to time. Chicago has been recording one death this year for each 19 accidents. The accidents occur at the rate of more than 27 daily. The average killings range around 43 per month and a forecast, under present conditions, of 516 deaths for the year in Chicago would in my opinion, be a reasonable figure. The police records indicate a decrease in the number of deaths although the accidents are on the increase. To date there have been 6,432 accidents severe enough to warrant police attention and official record. For the first seven months of 1923 there were 5,730 as compared with 5,118 for same period last year. This is a substantial increase in the daily mishaps.

The Spring and Summer months naturally are the time when accidents and deaths are greater. For instance, July, 1923, had 1,043 accidents and 45 deaths. The most frequent explanation of this is the large increase in the number of cars, the registration of which increased from 168,168 on June 1, 1922, to 213,242 on June 1, 1923. This represents a jump of about 26 per cent. During the first 7 months of 1922 there was an accident for

each 32 cars registered in Chicago. This year there has been one accident to every 37 cars so that but little progress in accident reduction seems to have been made. The present city administration is actively engaged in an endeavor to reduce accidents.

Personally, I think that the subject does not suffer for the want of publicity. What is needed to make our efforts fruitful is something to bring home to every motorist a sense of his personal responsibility in the prevention of accidents and if this can be achieved, the Safety methods employed by large commercial organizations in this direction can be relied upon to complete the work. It takes two to cause an auto-pedestrian accident and as a rule one of the two is careless, reckless or ignorant. Our organization has done everything possible to rule out this latter class and if we can look forward to some program which will take care of the nonprofessional chauffeur in a like manner our troubles will be over.

DISCUSSION

Mr. Hitt: Mr. Hanrahan's operations are not comparable with ours because most of his are in the Loop.

Mr. Hanrahan: We operate all over the City of Chicago. We have 1,000 wagons in Chicago and 375 are in the loop.

Mr. J. P. Malloy (General Accident Assurance Corp. of New York): Some of the points brought out by Mr. Hanrahan are very interesting. He brought out the fact that the American Express Company gets at the man at the wheel. They look up his previous experience to find out what kind of a man he is—what his record is.

If the City of Chicago takes that much interest in the employment of chauffeurs in issuing licenses, if they test him through the police department, does the state do anything?

Mr. Hanrahan: Yes sir. A chauffeur has to pass three tests.

Mr. Malloy: That seems to be something new. The city of New York has no supervision over the chauffeurs that drive commission trucks. They have over the taxicab and hack drivers but not over the commission truck chauffeur.

Another point he brought out was the inspection of equipment. It seems that it is most important to have a man looking over the brakes etc., on a vehicle.

Mr. Hanrahan: I might add for your information that in our garages in Chicago the chauffeur is supposed to test his brakes before he goes out and if he finds a defective part in the machine before he goes a block, he is to bring the car back and get another one.

Mr. Malloy: Do you keep a record of the inspection of that machine?

Mr. Hanrahan: Yes, every night. The day cars are inspected at night and the night cars in the daytime. A set of mechanics look over every machine before it goes out.

Mr. Malloy: In reporting an accident, do you instruct your men what to do?

Mr. Hanrahan: They have to bring in the names of witnesses and the nature of the accident and turn it into the casualty department.

Mr. Malloy: That is where it stops with you. Then I presume it is turned over to some division to investigate the witnesses. How can you tell whether the witness has given a false name or whether the driver put down a false name?

Mr. Hanrahan: We verify the statements to see that they are correct. I don't have an opportunity of finding that out. But, if it is the case, the casualty department gets that.

Chairman Walker: The fact that you make a complete investigation of the accident would make it almost impossible for a man to get away with that kind of thing.

Mr. Malloy: A lot of men are timid. They will stand there and then turn to a person and say "Did you see the accident?" If the answer is "yes" they ask "What is your name and address?" and the person addressed gives a false name and address. On the other hand, the chauffeur may have no witnesses and he is instructed to get them, so he puts down some phoney names.

Mr. Hanrahan: I have never run across a case like that.

REPORTING ACCIDENTS

Chairman Walker: I would like to ask Mr. Hanrahan how far their instructions to their chauffeurs go, particularly with reference to reporting accidents.

Mr. Hanrahan: If they have an accident before they return at noon, they have to report it at noon. We have to have an immediate report.

Chairman Walker: The point I want to reach is how far your instructors go with these men in instructing them what is the proper thing to do in the event that they have an accident with reference to getting information for that report.

Mr. Hanrahan: We show them how to fill out the forms. We have a regular form we give the vehicle man that he carries with him. There is a place on the form showing the distances and the streets, and the way he was going and the way the other vehicle was going, and he has to draw a diagram as to the positions of his vehicle and the other on the back of this form.

Mr. J. J. Dowling (American Railway Express Co., Buffalo): Mr. Malloy asked a question about "phoney" witnesses. I don't believe that out of all the accidents we had in New York City in 1916 that we had more than five where it developed that the driver had given the wrong name.

It is usually due to someone standing around who tells the driver that he is John Smith and gives an address. Of course, when the investigator that is sent out reaches that address there is no John Smith there. I think there is a tendency on the part of the public not to give their right names.

Mr. Malloy: Of course I am not in the investigation section but when I asked a driver why he gave a certain name he said, "What difference does it make whether I put down a 'phoney' name or whether they give me a 'phoney' name, because that is all they ever give me—'phoney' names."

Chairman Walker: I would say that was a peculiar case because in several thousands of cases, I have never run across that.

Mr. Dowling: We always request our drivers to give us all the names and addresses.

Chairman Walker: Because of the seasonable nature of our business, we get men who are not properly instructed and frequently they have an accident the first day they start and they simply don't know what to do.

Mr. Hitt: We have an investigator to canvass the situation.

"DOCKING" THE MEN

Mr. Oliver Remmers (Attorney, Anheuser-Busch Co., St. Louis): I suppose that we have the largest refrigerating plants in the country and about forty ice plants. The safety movement is not centralized in the ice plants. Some years ago I had considerable difficulty with the men falling in our Second Street plant, which is so large it is almost useless. The men fell on the floor when lifting the ice with the automatic lifters, putting the cans in the hot water to release the ice and dumping into the chutes. They seemed to have a habit of falling off the floor into the pits. I made a personal investigation and couldn't find why the men fell, but they did fall, so I instructed the chief engineer of the Second Street plant to put a double railing completely around the floor and said "Now if the men fall, we will have to place mattresses at the bottom of the pits," but I discovered by putting these railings around, especially at the point where they put the cans into the hot water, that the accidents were eliminated.

We have no ice delivery business. A little of the ice we sell is taken up by peddlers; most of our ice is used for our own purposes.

On the question of deliveries I made this observation; we carry most of our insurance ourselves. The number of cases of delivery accidents is very small.

Sometime ago we had an epidemic of small accidents, that is ten, twelve and fifteen dollars, where there was absolutely no excuse on the part of the driver.

I took this remedy. Our plant is one hundred per cent unionized so we have to do things with caution. I had the general superintendent issue an order that any fellow that had an avoidable accident was to pay the damage himself, and I waited for a good opportunity of getting one where there was no excuse and made the man pay the damage. Of course, the union officers swooped down upon us. But you would be amazed at the reduction of these inexcusable small accidents after one or two fellows had been docked twelve or fifteen dollars from their pay.

Mr. Hitt: We carried one of those cases to the Supreme Court and lost it. There was about \$20 involved.

Chairman Walker: We have had two or three cases in court where we have been upheld.

I don't know just what the theory was, but our courts have held that where the man has had the accident through his own negligence, and I think the law is clear on that point, you can collect from that man.

ACCIDENT HAZARDS OF THE ICE INDUSTRY

O. F. WILKINSON, CITY ICE AND FUEL COMPANY, CLEVELAND, OHIO

I believe that the particular company I happen to be working with is no worse than the ordinary ice company. I think we are typical of what is in the ice industry.

There remains an awful lot to be done in our industry. It is true that we have a good many things to contend with that do not prevail in an established business that runs the year round, but we have done very little to cope with it intelligently, or with any effort at all.

Most of the ice companies throughout the country spend the winter months getting ready for the summer rush and when the summer rush is on they are busy taking care of Mrs. Jones' and Mrs. Smith's iceboxes and forget all about trying to plan for the bigger or smaller things that go to make up such a large part of their total costs of operation.

We have in the city eighteen stations. A station comprises either a plant or delivery unit, barns and wagons, or it comprises storage. Each plant or station is in charge of a superintendent. The city is divided into two sections and we have a divisional superintendent over each section. Over the divisional superintendents we have a manager of deliveries. Nobody picks men except the superintendent. The superintendent hires his own men and if there comes a hot day and he must get men to get the service supplied, we find that as a result, he picks all sorts of fellows.

I found a man on a coal wagon who had one arm. He was driving a fiery horse. He was a good man, but he was not qualified for the job.

We have in the height of summer about 300 delivery units, 300 routes we call them—horses and wagons. Part of that is motor equipment, but only a small part. Every winter, or every spring rather, our man in charge of live stock covers the United States to find the choice horses and get them for our company, Iowa, Illinois and Ohio.

Now, to bring those horses into the city in the spring and break them into city delivery is quite a task. So, every spring we have a number of very serious accidents.

Another thing, our horses are seldom tied. A fiery horse has a weight, but many of these horses have been in our service for a long time and they learn the routes as well as the men themselves. In fact, sometimes they know the routes better than the men. They know just where they are going to get an apple—the families like the horses and pay quite a bit of attention to them. If we change a horse on a route sometimes it causes as much comment as if we changed the driver.

The horses go down the street, the driver delivers ice to Mrs. Jones and comes out and the horse has already stopped at Mrs. Smith's and then he delivers ice there. But sometimes they don't work according to Hoyle. They bang automobiles, get on the curb and chew trees, and it costs a lot of money. Sometimes something unusual comes along and it frightens the horses and they run away and cause serious accidents.

CHANGE IN OFFICIALS' POINT OF VIEW

I find in the last year or two, our point of view of accidents (I mean the point of view of the higher-ups in our company) has changed materially. I attribute the change principally (now this is putting it on the meanest basis I could) to the more detailed information that activity in the accident department has brought to their attention. We discuss costs of accidents and the expense of it is pressed upon them at every opportunity and as a result of that, accidents are really coming to mean quite a bit to all of the officers and the superintendents of the company—coming to be quite a factor in their operation.

As soon as the company had to pay for accidents, accidents became of great importance to it.

We carry under the two main divisions—the compensation and public liability. Under public liability we have property and personal injury. We carry that ourselves. I believe that up until now \$12,000 has been the most we have paid out in any one year for public liability, including property damage and personal injury. I cross my fingers on that because next year we may get a \$25,000 verdict.

Our workmen's compensation was costing us in the neighborhood of \$36,000. It should have been a little more than \$40,000 but we got a rebate. We have been in that a year or two years and it is costing us a little less than \$15,000. That saving has also been a point in our favor.

Now then, in outlining the kinds of accidents we have, I have eliminated everything in most of this except the ice business because I assume that we here would be most interested in that department.

NATURE OF INJURIES

Our workmen's compensation for 1922 cost us two cents a ton for all ice manufactured. Liability for the same period was 1.13 cents. The total was 3.13 cents per ton of ice manufactured and delivered. The injuries they received were about as follows:

Fractured bones of feet.....	5
Other fractures	1
Crushed fingers	7
Dislocated members	3
Infections (last year)	46
(Some very serious and expensive—most very slight)	
Sprains and strains.....	65
Contusions and abrasions.....	62
Eyes and hearing.....	5
Burns	4
Punctures and lacerations.....	51
Occupational diseases	3

That made a total number of reported accidents 252—252 compensation accidents.

This year, because of other things crowding in, accidents have not received importance. We have been putting more efforts into sales. For the first eight months we have had almost as many accidents as we had

last year. And the cost of workmen's compensation for the first eight months has been a little over two cents. We have had 234 accidents in eight months of this year, which is nearly equal to the total of last year.

We had 311 liability accidents reported last year. This is for the whole company—liability is for the whole company, all of our operations. The total cost last year for all accidents including personal injury and property damage was \$14,627. This year we have already spent \$9,869 in public liability accidents.

We have all of our accidents worked out and complete records kept but I will not bother you with the details. I could give you causes of public liability accidents which we have analyzed in great detail and have full data on it, but I will just point out the things that seem of importance in our trouble.

We have tried to work out some way of preventing accidents and here are a few of the things we have done.

DISCIPLINARY METHODS

Starting in 1922 we made a rule that every man who had an accident had to come to the main office. They worked all over the city and they never got to the main office unless something happened specially. He had to report to the main office the day after the accident and one of us in charge of the accident department quizzed him and analyzed to find out the causes and got the witnesses needed. That day he didn't work and drew no pay. That helped us a great deal. That was a long, long step ahead of what we had done before.

Previous to that we sometimes didn't know of the accident until the party reported it to us. We would then hunt up the driver and he would acknowledge it and say he didn't think that it amounted to much.

However, it didn't work out very satisfactorily because frequently the damage that was done was so slight that it was unfair and illogical to compel the driver to lose a day and come to the office for it. The horse may have done a dollar and a half worth of damage—it may have damaged a fender, and yet the driver had to lose a day and come to the office, and we got in trouble with the union.

We had no way of telling which driver should come in and lose a day and which should not. You must understand too that in a large degree the superintendents are against the accident department because they want the men on the job. If a man has an accident which is very bad, the superintendent is instructed to lay him off. The big job the superintendents have is to get service to the public and get it to them cheaply, so that we are working against a handicap from that angle.

This year we changed the rule. They must come in and report the accident but they need not lose their day's time. If it appears they are careless or neglectful then we either ask that they be discharged or punished in some other way, laid off for a certain number of days or weeks.

We have been using the National Safety Council bulletins and also bulletins published by the Ohio Association of Industry. Those we have found only slightly helpful and that is the reason I am anxious to get a section of the National Council so that we can get a bulletin service applying to the ice industry. I find that it is harmful rather than beneficial for us to publish or post a bulletin which does not apply rather closely to the iceman's job.

Another thing that is helping us, as Mr. Walker pointed out, is keeping detailed accident reports. We have our accident reports for a number of years and we keep a card index of each employee's record. If he has an accident it goes on his card.

What the future holds for us none of us can tell, but I am sure that our own company is going to have a better record. I believe the attendance at this Congress will help the City Ice and Fuel's record in the accident department. Being here has given me an inspiration to go back and do a better job than I have ever done before.

DISCUSSION

Mr. Hitt: What are your payments in Ohio per week?

Mr. Wilkinson: They are now \$15 after the first week.

Mr. Hitt: We start at \$14 and go to \$17.

Mr. Wilkinson: The first of January ours goes to \$18.

Mr. Remmers: Have you appointed any safety committees in your different divisions of men?

Mr. Wilkinson: That is one point on which we are weak. It has been hard for us in Cleveland to get an organization of any kind. Our men are scattered all over Cleveland, and the boys work six days a week and the pressure on them is pretty strong. We maintain a rather high output. I believe the other men present will bear me out in that our average output per wagon ranges very high. The pressure to get work done is very strong. The men work all day and it is difficult to get them together either in the day time or at night.

Mr. Remmers: After a day's work they are not ready for any meetings.

Mr. Wilkinson: Last year the retail routes and the wholesale routes—every route we had on the street—averaged about 3,200 pounds of ice per outfit. It represented a good many hours work, because in winter time they will get down to an average of 4,000 or 3,500 pounds.

Mr. Hitt: How are you going to organize a safety organization in your plant, particularly in times of labor shortage you can't get men who speak English?

Mr. Wilkinson: We pay a good wage and as a result we get a pretty good type of fellow. Our trouble is not with the new men or the younger men we take on, but it is in overcoming the prejudice of the old men. Some of the old foremen are just a stone wall. Some of our superintendents sold out to the company twenty years ago and they are still running one of these plants and it is impossible to tell them anything new.

Chairman Walker: I believe it is possible to overcome this prejudice. You have got to sell the idea to the top man first and gradually work down.

Mr. Hitt: I worked on our people until they got sore.

Mr. Wilkinson: With us, you understand, we haven't any man whose duty it is to watch accidents alone. We do that overtime largely and we haven't given it enough attention. But, we are going to start something different and try to work out an organization for safety work.

Mr. Hitt: We called on Mr. Webber of the Consumers Co. (Chicago), who has had a very remarkable record in reducing accidents. He has not been able to do any more than we have been able to do in our company, so far as perfecting any organization in the plant.

Mr. Wilkinson: A year ago we gave all of our superintendents a course in first aid. That helped us materially.

Mr. Hitt: We found they were careless. We would rather pay \$2 and have a doctor.

EDUCATING THE WORKER ALONG SAFETY LINES

Mr. Wilkinson: We pay our doctor by the year, and the more cases we send doesn't cost us any more. The first aid did not help us in reducing the number of doctor calls, but it helped us in showing the men and the superintendents how dangerous and how important it was that the injured person get to the doctor right away.

Mr. Hitt: We put up some ghastly pictures that worked on them.

Mr. Remmers: It is strange about those ghastly pictures. We also have a wagon department. They had a very bad picture of an infection up that the National Safety Council had sent out. It was put up on our bulletin board in the wagon factory. Some of the men who saw it said "You'll have to take that picture out or we will quit." I told them to take it out.

Mr. Wilkinson: If we have an accident that is very bad and has some very annoying features about it, we write up a description of it, make it is accurate and fair as we can and post that in a bulletin board so that the whole company knows that John Jones ran over a little girl last week. It hurts John Jones to have that on the bulletin board.

We of the accident department get the accidents pouring in from all over the city, but the fellow working with 40 or 50 men, knows only those working in his plant. If we gave him a report from the accidents in the city, it would help him recognize the seriousness of it.

Mr. Remmers: While our chief officers were sympathetic to the safety movement, our general superintendent, who was one of our best men in the line, was not completely sold on safety. He didn't want to lose any hours working on safety. We worked up our safety movement, not from the top down, but from the bottom up. We picked out likely fellows in the different departments.

We have a safety engineer and it is necessary for him to be about the plant continuously. In connection with his work in the engineering department as a consulting engineer, he also has the title of safety engineer. You will all be amazed to learn that our total payments to employees for injuries in our plant this year amounted to but \$2200. That has been a steady decrease in a five year period. Every year it shows less.

I have discovered that you have to go to the men themselves to sell them the safety ideas—ask them for suggestions, and we have safety committeemen in every department. We give them buttons. We have a general safety committee which meets once a month. There are no two men on that safety committee who do the same kind of work. We have engineers, master machinists and superintendents from the different departments.

Mr. Wilkinson: Our departments have become so separated as to be almost as independent as separate companies. One of our troubles will be to get a safety committee composed of all.

Mr. Remmers: I see a wonderful opportunity with your company, that is to create separate safety organizations in each one and start competition and offer prizes to the unit which has the lowest number of accidents and lost time cases and also public cases. A number of companies have tried that.

REPORT OF NOMINATING COMMITTEE

Mr. Hitt: The report of the nominating committee is, Chairman, F. P. Walker; Vice-Chairman, Ralph Dodson; Secretary, O. F. Wilkinson.

Mr. Wilkinson: I would like to say there gentlemen, that I doubt whether I could act as an effective secretary. I believe the secretary should be a man with different characteristics from those I possess and fitted differently in his own business. I think you could pick a man out of the ice industry that would be very much more capable as a secretary than myself. I will be glad to work with you and do anything I can.

Mr. Hitt: We discussed it and we felt that you were very close to Mr. Walker and you were both enthusiastic. I think it is a very wise idea to keep Mr. Wilkinson here. However, I will withdraw and submit a new nomination: Chairman, F. P. Walker; Vice-Chairman, O. F. Wilkinson; Secretary, Ralph Dodson.

Chairman Walker: We will appoint a bulletin committee at the Annual Convention of the Ice Industries in Cleveland, November 13th to 16th. Gentlemen, what is your pleasure with regard to the report of the nominating committee?

(The nominees were unanimously elected.)

ADJOURNMENT.

Marine Section

October 2, 3 and 4, 1923

W. E. WELCH, Chairman

Safety Engineer, The Travellers Insurance Company, New York City

CAPT. IRVING L. EVANS, Vice-Chairman

Vice-President, United States P. & I. Agency, Agents for the United States Shipping Board, New York City

A. A. CLOSE, Secretary

Wm. Spencer & Son Corporation, New York City

TUESDAY MORNING SESSION

CHAIRMAN WELCH: It is with great pleasure that we welcome you here in the name of the National Safety Council and the Marine Section.

We have but a few members at present mainly on account of the very depressed condition of the American Merchant Marine in general. It will be the duty of the pioneers of this section to interest those who now seem lukewarm to the great subject of safety in the marine industry in general.

The work we have done in this direction has been directed more or less by one general committee and I have been requested to make this one report for all.

This committee consisted of Charles H. Potter, president of the Potter Steamship Company and also president of the Maritime Exchange, Port of New York, and president of the American Steamship Operators' Association; Captain Irving L. Evans, vice-chairman of the section, and vice-president of the U. S. Protection and Indemnity Co., Inc., agents for the Shipping Board; A. A. Close, secretary of the section; Capt. P. B. Blanchard, of Turner & Blanchard, Inc., stevedores; Ellis Knowles, of C. D. Mallory & Co., Inc., and Frederick S. Titsworth.

We also desire to thank the officers of the Council and Mr. Cameron, the managing director, for their always ready help.

MARINE FIRE HAZARDS

FREDERICK S. TITSWORTH, E. M., ATTORNEY. NEW YORK CITY; ASSOCIATE
MEMBER OF THE SOCIETY OF NAVAL ARCHITECTS
AND MARINE ENGINEERS

It has been stated that the property loss from fire in the United States is \$4.75 per capita for every man, woman and child in the country. This is six times the average in Great Britain where the loss is approximately seventy-two cents per capita. We burn down one-quarter as much as we build. In the United States our insurance costs on the average 1 per cent of policy value or \$1.00 per \$100. In western Europe the insurance costs average 1/10 of 1 per cent of policy of value or ten cents per \$100. Of the total insurance premiums collected in this country about one-half are returned to the insured to cover fire losses and the remaining one-half is applied to expense of conducting the business and profits.

Such statements as these, together with such frightful fire disasters as that of the Iroquois Theatre in Chicago, the Collingswood, Ohio, school horror, the Triangle Waist factory fire in New York City, in which one hundred and forty-five lives were lost, have thoroughly awakened the public to an appreciation of the fire menace. Splendid work has been and is being done to decrease the fire hazard on land by such organizations as the National Safety Council, The National Fire Protection Association, government bureaus, and many local fire prevention associations. Their work, supplemented by legislation and local building regulations together with the reductions offered in fire insurance rates for better protected risks, has created a public consciousness which has been most effective in reducing losses. Today, a building cannot be erected without consideration of the fire hazard and a compliance with regulations covering fire protection. Furthermore, good business practice demands that buildings shall be constructed to resist fire and shall be equipped with modern appliances for fire detection and extinction.

It is timely, therefore, that this great organization which has accomplished so much for the conservation of life and property on land, should turn its attention to the shipping world. So much can be done and so little has been done, in the interests of the ship owners and operators and their clientele of passengers and shippers that this field offers great opportunity for service in the propagation of those principles and methods of safety which have been so effective in the protection of life and property on shore. An interesting study might be made of the question why it is that almost everything connected with maritime business practice is so different from business confined to operations on land. One plausible reason may be that tradition and precedent have such great weight in shipping affairs. New methods are frowned upon and suggested change of any kind is not as a rule favorably received.

PREVENTABLE PERILS MUST BE SAFEGUARDED AGAINST

Perils of the sea are well known. They may be roughly divided into two classes—preventable by the exercise of foresight and carefulness—

and unpreventable, which cannot be foreseen or avoided by the highest degree of human care and skill. We are to consider only the fire hazard which is unquestionably classified under the preventable perils.

The fire menace, so well recognized on land or as the skipper would say "on the beach", for some unaccountable reason, is not very seriously considered by the overseas traveller or by the export shippers of cargo. And yet is commonplace to say that fire is the most dreaded peril of the sea and of all calamities which might befall the ship most feared by the officers and crew.

What are the facts? What proportion of the total lives lost and property destroyed at sea is caused by fire? The writer had occasion to study the available statistics in answering this question and collected them in a paper which he read before the American Society of Safety Engineers and published in the April, 1921 number of *Safety Engineering*. It will not be necessary to repeat them here and we will only extend the summary there given of the property loss by fire in United States shipping as given by the Steamboat Inspection Service of the United States Department of Commerce to include the years 1921-22. In 1921, total property loss, \$20,025,214; of this, \$2,789,147 by fire. In 1922, total property loss was \$17,298,752 of which \$3,672,996 was due to fire. Conclusion was reached by the writer in this paper that fire was the cause of over 12 per cent of the total marine property destroyed. This percentage must now be increased to include the larger losses by fire in 1921 and 1922. If the two war years of 1917 and 1918 are not considered, the average marine fire loss for ten years past will be found to constitute over 15 per cent of the total property lost in hulls and cargo. Figures covering the total marine property loss for the fiscal year ending June 30, 1923, are not available but the total exceeds \$3,600,000 showing there has been no reduction in the amount lost by fire. In this same paper it is found that over 7 per cent of all casualties and 2 per cent of all deaths (including suicide) on ship board, are due to fire.

Sir Westcott S. Abell, chief surveyor for Lloyds, a recognized authority on shipping losses throughout the world, whose judgment and opinion is unquestioned in marine circles, read a paper on sea casualties and loss of life before the North East Coast Institution of engineers and shipbuilders on the 4th of November, 1921. He proved conclusively, from a critical analysis of sea casualties in British shipping for the 23 years immediately preceding the World War, that casualties caused by fire are the only ones on the increase, having increased about 400 per cent in the period under review. Sir Westcott's percentages are based on the total number of casualties and not on the value of property lost. His figures show that the fire hazard had increased so that it caused about 9 per cent of the total number of casualties at the end of this 23 year period.

These facts should be sufficient to prove why our shipowners and operators should be persuaded to exercise greater precaution by adopting and enforcing more rigorous rules and regulations in the care and operation of their ships and by installing sufficient equipment for the

detection and extinction of fire so that the lives of passengers and crew will be better protected and the needless waste of property reduced to a minimum.

LOCATION OF SHIP FIRES

An analysis of the statistics compiled in the writer's paper, to which reference has been made above, shows that the greatest menace from fire is, without question, located in the cargo holds, bunkers and inaccessible closed spaces. The superstructure is fairly well protected and is constantly under the supervision of the ship's officers and crew. There the fire is easily located and can be promptly reached by the fire hose. Greater supervision however should be maintained while the vessel is in port, for a large percentage of ship fires in the superstructure can be definitely laid to lack of efficient watching. Fires in the superstructure at sea seldom lead to disastrous consequences.

There are rules and regulations, originating in Acts of Congress and supplemented by the Steamboat Inspection Service which require necessary fire detection and extinction equipment in the superstructure of passenger vessels only. Furthermore, the federal law requires the installation of 1½ inch steam pipes in every cargo compartment of passenger and non-passenger vessels alike, for the purpose of *extinguishing* fires in the cargo. But curiously enough, and the reason is not apparent, no rule or regulation requires the installation of fire *detecting* equipment in the holds and cargo compartments where the fire menace is, by far, the greatest.

Imagine, if you will, a warehouse built without windows or doors from three to four stories high, with each room filled with miscellaneous inflammable material of all sorts—some highly combustible and subject to spontaneous combustion. The only access to this building and its contents is through a skylight in the roof. Imagine a few ventilators leading to a few rooms, one ventilator serving several rooms.

There are no fire detecting appliances in the building. A complete sprinkler equipment is installed in each room but is not automatic—it has to be manually operated. The only possible way fire can be discovered in this building is by observing the escape of smoke from the skylight or ventilators in the roof, after the fire has gained sufficient headway to produce a sufficient degree of heat to force a volume of smoke through these openings.

Even then, the escape of smoke will not determine the location of the fire. Can you imagine such an absurd structure erected and operated by a sane business man? Yet, that is a fair description of the conditions on board the great majority of vessels. As to the nature of the cargo with which these inaccessible compartments are filled—and packed solidly also to prevent shifting with the roll of the ship—read what Chief Kenlon of the New York Fire Department has to say on the subject. "Fill these sheds (cargo waiting for stowage) with every sort of combustible material imaginable—hogsheads of rosin, bales of cotton, crated furniture, barrels of pitch, stacks of dry goods and such inconsiderable trifles as a few boxes

of celluloid toys and novelties, and can the mind of man conceive a collection of heterogenous merchandise more calculated to provide the wherewithal for a conflagration."

Here also is what Edward J. Shallow, district chief of the Boston Fire Department said in a paper read before the International Association of Fire Engineers in Chicago, June 4, 1918.

GOVERNMENT RESPONSIBILITY IN SHIP FIRE

"No matter how small a ship fire may appear it should be treated as an incipient conflagration. Why should not the Government by some action, take from the shoulders of sailors and firemen, the exclusive burden of fighting fires on ships and place some of it where it belongs—on the owners. On Navy vessels, the officer of the deck, by looking at a dial on the bridge at any time knows the temperature of magazines, bunkers, etc. What an advantage to a merchant captain that would be? How much quicker a chief could get to work, if on arrival, he was told just where the fire was located. Why should not Congress pass a law that owners must install devices to locate and control fires? Why should not every available means to locate and combat fire on ships be taken advantage of by owners and underwriters? Such action should tend to greatly cut down fires and save ships and maybe, at times, life. On arrival, the first care is to locate the fire, find what the cargo consists of and how the ship is laden. This is usually obtained from the ship's officer in charge. If he is unable to give the information, the fire chief must be guided by the volume of smoke arising from the ventilators and the heat on the adjacent parts. By these signs a shrewd guess can be made, but it is only a guess, and the chief may be mistaken. If the ship is loaded to the hatchway, the ship must be flooded to the point of the fire. Unlike in the case of fires ashore, there is little or no chance to remove the cargo and get at the actual seat of the fire and it can be subdued only by actual weight of water or flooding."

We cannot disregard the opinion of such an eminent authority as Chief Shallow. The United States Steamboat Inspection Service is doing everything it can to bring about safer conditions in our shipping, and we feel that it would welcome more specific regulations by Congress.

Answering the question raised by Chief Shallow we would say no good reason occurs to us why Congress should not compel the installation of fire *detecting* equipment in the cargo compartments of all ships flying the American flag, particularly as it has already made the installation of fire *extinguishing* equipment compulsory. In effect, Congress has declared that ship owners must put salt on the bird's tail but has not required them to catch the bird. This may seem an absurd illustration but it is particularly in point, for the vast majority of conditions, if the source is located it is just as easy to extinguish a fire in its early smoldering stages as it is to catch a bird if you are close enough to salt his tail.

SHIPOWNERS VS. INSURANCE UNDERWRITERS

But you ask, "Why do not shipowners sense this situation and, without compulsory legislation, install fire detecting appliances throughout their vessels?" The reason is that it adds to the capital cost of the ship and does not bring any immediate returns in dollars. They argue that they can afford to take the risk and if fire breaks out the insurance underwriters are the losers—not considering the possible loss through time consumed in repairing the ship. To this, you will probably say, "The insurance underwriters will quote a lower premium on ships that are properly equipped and the owner will more than pay for this added equipment by the reduction in insurance costs." While this is true on shore, the practice is not followed in writing marine insurance. The marine underwriter does not offer any reduction in premium rates for the installation of any equipment whatsoever. There is much that could be said of the reasons why such a policy is maintained. The underwriter will tell you he is not making any profit at present on hull rates and cannot afford to lower them; that competition is a real element in marine insurance and, in the last analysis, is the final determining factor in making rates. Furthermore, marine insurance, unlike fire insurance, covers a variety of hazards—collisions, foundering, groundings, explosions, etc., in addition to fire. A loss to the underwriter is a loss regardless of its cause. He will tell you that if he reduced the premium on account of the owner lowering the fire hazard, on the next trip the vessel might, through the incompetency of the captain or through some other unforeseen reason, suffer a total loss by collision. As the causes for loss cannot be forecast, neither can the rates based on a variety of losses be scientifically determined. Marine insurance is a gamble pretty much as it used to be in the early days when the business was first developed. Again the underwriters may tell you that he bases his rates on the past history of the operator and the vessels covered by the policy. He argues that it is no part of his business to suggest to the owner how he shall equip or operate his ship and as a matter of duty and good business he should install the best and most modern equipment and do everything possible to eliminate losses from fire and every other peril of the sea without being induced or paid to do so by the underwriter. That, if he will reduce his losses, the insurance rates on his vessels will surely be lower and he will be compensated for additional capital and operating expenditures. The owner, however, will tell you this sounds very well in theory but does not work out in practice, and there is no profit for him in spending money to reduce the risks which he pays the underwriter to take for him. You will note the difference between this theory of writing marine insurance and the practice of the fire underwriters who make large reductions in premium rates where special equipment is installed.

The fire hazard in the closed compartments is here stressed because it appears to the writer to be the outstanding sea peril to which application of common sense safety measures will yield the most profitable results. But there are other parts of the ship which should not be neg-

lected. The danger from oil fires is becoming an increasing hazard and every ship burning oil as fuel should be equipped with the most modern and efficient apparatus to detect and extinguish such fires and the crews should be given special instruction in extinguishing them. Also the importance of general cleanliness should be mentioned. The accumulation of dirt and rubbish in any part of the ship should be prevented, and to accomplish this the severest measures would be fully justified. It is a wonder there are not more ships lost by fire when cleanliness is considered of so little importance by many operators.

So much depends upon inspection. The insurance underwriters could, if it were possible for them to agree on a working plan, do much toward encouraging owners to reduce the danger from fire by rewarding those exercising the highest degree of care in the operation and maintenance of their vessels and penalizing those who do not. Here again competition for business blocks the way and dirty ships get by the inspectors, and their owners enjoy the same insurance rates paid by the more efficient operators.

DEPENDENCE ON INSURANCE BLAMED

There is another very important consideration which influences the shipowner and deters him from increasing the capital cost of his vessel by installing additional fire protection equipment. When a merchant has an overland shipment to make he is accustomed to route his goods over the railroads which he has determined, through past experience, will give him the best service in promptly transporting his freight to destination and in good condition. Not so the merchant who exports his goods overseas. His shipments are usually routed by brokers who select the vessel offering carriage of the goods on the lowest terms and sailing nearest to the time they are delivered at port of shipment. The cargo owner secures his bill of lading, insurance and other documents at the time he makes shipment from the interior and never bothers himself who will transport the goods overseas. In the event fire breaks out in the hold where his goods are stowed resulting in their damage or total destruction, the cargo underwriter pays the loss. This, the owner of the ship and his underwriter say, is no concern of theirs unless the ship itself is damaged. A very small fire in a cargo compartment usually leads to very large losses if the goods stowed therein are at all perishable and, quite frequently, causes little or no damage to the ship. To be fair to the shipowner and at the same time protect their own interests, the shipper and cargo underwriter should discriminate in favor of superior service—rewarding by increased patronage and lower cargo insurance rates the shipowner who gives better service through better protection from fire and other hazards. Everything considered, the cargo underwriter really secures the greatest monetary advantage from a reduced fire hazard. As soon as the shipowner is made to feel that better service is demanded and appreciated we may be certain that better fire protection will be forthcoming.

So far, we have been considering only the dollars and cents side of this question, but far more important is the protection of human life. Is it right to discriminate between passengers and crew? Why should passenger ships have to exercise a higher degree of care to protect their passengers than they do their crews? Is it fair to say the officers and crew expect when they ship, to take extra hazardous risks as part of their employment? We have already stated that the fire hazard is greater on non-passenger than on passenger vessels. The rules of the United States Steamboat Inspection Service should be amended to apply equally to each type and should require fire detecting as it already requires fire extinguishing equipment on cargo as well as passenger ships. Must we wait until a great catastrophe from fire occurs at sea with a staggering loss of human life to awaken the public to demand sufficient fire protection on our ships? Some day it will come if steps are not taken to prevent it. If fire originating in the inaccessible holds of a ship ever gains sufficient headway before it is located and discovered and breaks through into the superstructure and becomes uncontrollable, the world will be horrified by the news of the disaster unless there are no survivors to tell the tale. In that case the ship will be listed as "lost at sea" and we will be spared the horrors of its unfortunate victims. The possibility of this happening on any one of the great majority of our big ocean liners, with only a few notable exceptions, is not a bad dream but a very sane conclusion from the conditions as they now exist.

NEED SHOWN BY RECENT DISASTERS

In 1920, there were 219 ship fires in the port of Greater New York. Fire Commissioner Thos. J. Drennan reports losses during the same year of over \$1,000,000 caused by ship fires. Has the traveling public forgotten the S. S. Volturno disaster of October 19, 1913 when 103 lives were lost and the 554 out of the total of 657 were saved with the greatest difficulty, aided by 14 different ships which happened to be able to reach the burning ship before she sank beneath the waves? The fire on this passenger ship started in the forward hold and a passenger was the first to discover it through the presence of smoke. It must have been burning for some time before it was discovered and then it was too late to extinguish it. Or has the public forgotten the S. S. Tokyo Maru, steel vessel, whose passengers and crew were saved at the last moment by our Army Transport Buford, May 2, 1921, which reached the vessel in response to the wireless call "on fire and sinking fast"—or the S. S. Honolulu, swept by fire 670 miles off the coast of California October 3, 1922, and whose 73 passengers and 145 officers and crew were forced to take to the lifeboats and rafts less than four hours after the discovery of fire before the arrival of the freighter West Farolon? A calm sea saved them, for had the disaster happened during a storm or heavy sea, probably all would have perished before they could be rescued.

Secretary of Commerce Redfield called an advisory conference on the subject of making passenger vessels more secure from destruction by

fire which was held in his office in Washington, May 3, 1916. He told the conference he had a record of 63 vessels more or less completely destroyed by fire within two years. No legislation resulted from the conference and the matter was dropped due no doubt to the participation of our country in the World War.

There are three well proven methods of extinguishing ship fires in cargo spaces. Water, of course, is the medium most frequently used and has the double advantage of not only smothering the flames but also reducing the temperature and thereby preventing a second outbreak. But on board ship the use of water has very decided limitations. To be effective it must be delivered at the seat of the fire. Usually this cannot be done in cargo fires as the source is inaccessible and a stream of water cannot be played on the flames. Furthermore, flooding of the hold seriously endangers the stability of the ship and is also destructive to cargo. The use of water is therefore confined to parts of the vessel other than cargo compartments. Steam is a well recognized fire extinguishing medium for the cargo spaces, especially when applied during the early stages of combustion. It operates by replacing the oxygen of the air upon which the fire feeds, thereby preventing its spread and smothering the flames. Because of its gaseous nature, steam can be forced through all the interstices between the cargo and quickly reaches the source of the fire. It holds it in check and prevents its spreading, but has the disadvantage of not appreciably reducing the temperature of the burning mass. It also is damaging to cargo but not nearly as destructive as water, and unlike water, does not in any way endanger the stability of the ship. Of course, steam can only be used in the closed spaces of the ship not reached by passengers or crew. The third method—by the use of carbon dioxide (carbonic acid gas) is the latest and probably the most effective for the enclosed spaces. It has the advantage when used in a liquid form of reducing the temperature and the further advantage of being harmless to all kinds of cargo be it delicate fabrics or perishable food. As the use of carbon dioxide as a fire extinguishing medium will be covered in a separate paper at this session of the Marine Section it will not be further considered here.

METHODS OF EXTINGUISHING FIRES

The methods of extinguishing fires in the superstructures, machinery spaces, stoke holds and other open spaces of the ship do not differ from the practice on shore. Water delivered from the fire pump through hose, also water used through sprinkler systems, preferably the dry pipe type, is most effective. Also the various approved types of portable fire extinguishers are serviceable. Every ship should be thoroughly equipped to reach every accessible part with fire extinguishing equipment. It should be added that the use of oil as fuel makes imperative the installation of special equipment to extinguish oil fires. Water cannot be used here but there are types of apparatus using various forms of non-combustible foam which are very efficient. They act by producing

a foamy liquid which can be sprayed over the fire thus excluding oxygen and smothering it. Every oil burning ship should be equipped with this type of apparatus.

There are two classes of fire detectors—one depending on the development of heat to sound the alarm and the other depending on the detection of smoke and locating its source. Of the first class, the electro-thermostatic type is the more generally used. They are dependable and are usable on ship board throughout but are not advisable in cargo holds because of the danger from sparks caused by the supervising current through wires broken by the ship's motion or loading of cargo. The same objection applies to fusible plug detectors, but can be and is overcome by careful wiring as these systems are used successfully on our Naval vessels. Another type of detector depending on heat, operates on the principle of the expansion of an air column in a fine tube operating against a diaphragm attached to an indicating alarm. When the temperature rises the air expands and presses against the diaphragm. This system will only indicate when there is a sudden rise in the temperature. It can be adjusted to meet the various changes in the atmosphere. These three types of fire detectors operating by heat can be used throughout the ship but are most effective in the superstructure and other open spaces. The second class of fire detectors operate by continuously withdrawing a sample of the air through pipes which terminate in a central station. Any smoke in the vicinity of the pipes is drawn through them and detected by the smell and sight. This class is, of course, only adapted for use in the enclosed spaces of the ship.

Thus, it will be noted that ship owners have at their command dependable and efficient equipment for detecting and extinguishing any fire which may develop in any part of their ships. They should be encouraged to make use of this equipment. Unfortunately, the whole problem of fire protection on ships—insofar as it is not made compulsory by law—is in the vicious circle of that great popular game—"passing the buck." The owner says he will install proper equipment if the marine underwriter will reduce his premium rate so that he can recover the cost of installation. On the other hand, the marine underwriter says the owner should protect his ship as a matter of duty and if he does eventually his insurance rate will be reduced in proportion as he reduces his claims on the underwriter. Furthermore, the underwriter says he cannot afford to lower rates until the owner reduces his claims as the rates are already lower than they should be. They are both right and both wrong. What is the solution?

PROVISIONS OF FEDERAL LAW

The federal government, through Act of Congress, passed years ago and amended by act approved March 3, 1905, Section 4470 et seq. requires certain apparatus to be installed on ships and passes on to the Board of Supervising Inspectors and the Secretary of Commerce, authority to legislate further in the interests of ship fire protection as follows: "All such other provisions shall be made on every steamer carrying

passengers or freight, to guard against and extinguish fire, as shall be prescribed by the Board of Supervising Inspectors and approved by the Secretary of Commerce." This board, by virtue of the authority thus conferred by Congress, has promulgated the following rule applying to these types of vessels, viz: ocean and coastwise, great lakes and Bays, Sounds and lakes other than the great lakes and rivers.

"All passenger vessels of more than 150 feet in length, whose construction is contracted for after June 30, 1916, which are provided with staterooms or other sleeping quarters for passengers, shall be equipped with an efficient fire-alarm system or indicator which will automatically indicate or register, at one or more points or stations where it can be most quickly observed by the officers and crew of the vessel, the presence or indication of fire in the staterooms and various other compartments of the vessel which are not accessible to the observation of the officers or crew: Provided, however, that cargo compartments need not be provided with an automatic registering or indicating fire-alarm system, if such cargo compartments are provided with other approved means for the officers and crew to discover the presence or indication of fire."

So far as the writer is aware this rule has never been enforced as no means for detecting fire have ever been required in the cargo compartments. Furthermore, it will be noted that no fire detection of any sort whatsoever is required in non-passenger vessels.

The necessity is urgent. Is legislation the only way to secure adequate fire protection for our ships or can our shipowners and marine underwriters be persuaded to co-operate and give the public what they are entitled to receive—Safety First?

SHIP STEVEDORING HAZARDS

W. E. WELCH, SAFETY ENGINEER, THE TRAVELERS INSURANCE
COMPANY

Well versed authorities have often stated that during the past few years there has been a tremendous increase in the number of accidents to men working along shore discharging and loading ships, but very little, if anything, has been done to ascertain just why this increase has taken place.

Twenty-five or more years ago an accident to a longshoreman, while working at his trade, with its subsequent trouble and litigation for the employer, was a rare thing. Today, it is an exception to the rule if a steamer of modern type is discharged or loaded without one or more of these men claiming to have been injured during the operation.

In the olden days, which are often referred to as the "sailing ship days," a vessel was discharged or loaded by one gang composed of from eight to twelve men and the hoisting power was the now ancient draft horse. Practically all the cargo was discharged or loaded, as the case might be, through one hatch opening. This hatch was situated in the center of the vessel and all the cargo was directed to or from this point to be hoisted out or lowered into the hold.

With equipment of this kind it is not difficult to understand why there were few accidents. In almost every instance, the exception proving the rule, the eight or twelve men comprising a gang had worked together time and time again—in fact it was quite common to find gangs made up of relatives. This condition promoted what is termed "gang efficiency," which I will refer to later on.

Twenty-five or more years ago the employer did not keep records of accidents, as "compensation laws" were unheard of at that time and little, if anything, could be gained by an injured employee suing for damages as in those days jurors were inclined to give the employer the benefit on his plea of "assumption of risk."

WITH SPEED IN OPERATION CAME MORE ACCIDENTS

After the sailing vessel came the steamer, equipped with three or four hatch openings with the necessary cargo gear to work all hatches at the same time. Sheds were built over the piers in order that the vessels might be discharged as rapidly as possible and the goods stored on the pier to be delivered after the vessel sailed. Cargo was also assembled prior to the arrival of a vessel, which system greatly facilitated the speed of operation. Speed began to enter into the loading and unloading of steamers and more gangs were employed for the work. At first, the same efficient gangs did the work and undoubtedly very few accidents resulted from the slight increase in speed. This condition continued up to about ten or twelve years ago when the large modern steamer entered the field, and time spent in port was considered time lost.

So, therefore, in order to "turn about" a steamer as quickly as possible it required the hiring of a great number of gangs necessitating the employment of unskilled labor. The new men were distributed among the old in order that they might obtain proper experience which meant the breaking up of efficiency gangs and the creation of inefficient gangs. Gradually, the first of the unskilled labor employed became skilled but even more rapidly did the amount of tonnage increase, demanding greater speed. Steamers that formerly had been discharged by three or four gangs were now worked to the limit, six or eight gangs being employed at one time. Night work was added with all its attending dangers, and the vessels were "turned about" in almost half their previous time. Steamers were rushed to sea and it would be several days before another docked, which compelled the men to seek employment at other piers or other trades. Gangs were broken up again, and when another steamer did arrive a new organization had to be formed composed of men that were not accustomed to working together.

To refer again to "gang efficiency" let me say that contrary to the general belief among steamship men, efficient work cannot be accomplished by longshore labor unless the men in the various gangs are accustomed to working together.

Even the most skilled longshoreman will not give the best results unless working in a gang with men he has been accustomed to working with. Gang efficiency, as I have stated before, is absolutely necessary in order

to obtain the best results from the men as well as to avoid accidents. Records show that there are fewer accidents to men engaged in loading case oil than any other class of cargo although the hazard attached to this class of longshore work would seem paramount.

The movements of the drafts of case oil are exceedingly rapid, as many as two hundred drafts of oil very often hoisted into a vessel's hold in a single hour with one cargo fall. The labor employed at loading case oil is all highly skilled, each man having his particular duty and carrying out same with the precision of clock work. The gangs are made up of men who have worked together for years. If it is possible to load case oil in the manner mentioned above, there is no reason why general cargo could not be as efficiently handled if the foremen were able to pick the same men each time for handling of certain classes of cargo.

WAR BROUGHT INCREASED CARELESSNESS

I do think that it is fair when comparing the number of accidents that occurred during the days of the sailing vessels or the small steamers with the modern steamers of today, to give more than passing consideration to accidents that occurred during the World War, for during that period a vessel's time was gold to the owner; in fact, time was the only factor and the phrase "Work her around the clock," unknown before, became the slogan of the day. Prior to this time, special gangs were employed to handle every class of cargo. These gangs had taken pride in their work, but the war wrought a change. A gang handled whatever class of cargo came along. Thousands of extra men were needed to take care of the increased tonnage and the multitude drifted to the waterfront to reap the benefit of what was considered "good pay." Costs were forgotten by the steamship companies. Men and gangs were worked day and night and, naturally, efficiency dropped to a level unknown before. Cargo was thrown into the vessels, good stowage was forgotten, carelessness and inefficiency was everywhere apparent and it was about this time that the number of men injured while working along shore, greatly increased.

About the same time that the modern steamer was placed in service, the New York Workmen's Compensation Law was passed. This law made it compulsory to report all accidents, however slight. Although 50 per cent of the accidents that occur to longshoremen are not serious enough to compel loss of time, they do require prompt medical attention as a precaution against infection or other serious results. This means that the Compensation Law has been responsible for bringing to our immediate attention a seeming increase in the number of accidents that occur due to the loading and unloading operations.

A great many of the accidents caused to longshore labor could undoubtedly be avoided by the exercise of greater care on the part of the injured, for carelessness is undoubtedly the main offender. For instance, very often hatch covers are taken off and, together with the hatch beams, are aimlessly thrown on the vessel's deck for men to trip over, or often steps, placed against the vessel's rail for men to ascend or descend to the

deck, are not fastened, causing falls resulting in the breaking of a leg or arm or serious internal injury. There have been cases where some men have been crippled for life by having a ladder placed from the pier to the ship's side, fall while they were going aboard or coming ashore from a vessel. Men frequently make use of "fender" ropes or "save all" lanyards to slide down to the pier which is often the sure means of being injured.

PREVENTION OF ACCIDENTS OVERLOOKED

The effects of the Compensation Law began to be felt and employers rushed to insurance companies for protection. No thought was given to the *prevention of accidents*. Protection against damage or law suits was all the employer wanted.

All of this was abnormal from beginning to end, and cannot be considered as a true reflection of the normal stevedoring hazard. With the peace treaty came the decreased earning power of all vessels and the cry from steamship companies for economy. All of us who are familiar with shipping conditions know that at the present time very few steamers either come into or go out of port with full cargoes, and it is, therefore, absolutely necessary for steamship operators to curtail expenses. In the long run it is the steamship company that pays the insurance premium, for a stevedore cannot afford to be without insurance protection—first, because certain of his men, in the event of being injured, are entitled only to recover from the employer as prescribed by the Compensation Act, which in the State of New York is known as a "compulsory law"—and second, because of the liberality of the present day jury in spending other people's money when rendering verdicts in those cases where the compensation law does not apply and the injured man has brought suit to recover under the Common or Admiralty Law. Therefore, this insurance cost is made a part of the contract price, whether it be on a cost plus or tonnage basis and must be borne by the steamship company.

If the steamship operators would co-operate with the stevedore in trying to avoid unnecessary accidents, they would find that their insurance cost would drop considerably as the basic rates charged by the insurance carriers are modified by the application of the experience rating plan to the individual risk, this plan taking into consideration the losses paid in comparison to premium development. Very often a few dollars spent by a steamship company in repairing "strongbacks" or "hatch covers" that are short, due to wear and tear, and which would prevent them from dropping down into the hold, would greatly, if not entirely, prevent accidents previously caused by reason of their condition. The "strongbacks" and "hatch covers" are part of the ship's equipment and it is not possible for the stevedore to insist upon or compel the captain to make necessary repairs. Then again, if the steamship operators are in dead earnest in seeking economy they ought to further co-operate with the stevedore by instructing their captains to listen attentively to and aid him when he complains about the masts or booms furnished not being strong enough

to carry the various drafts, or when it is stated that the booms are too short to properly handle the draft. This will very often prevent serious injury, thereby saving insurance cost.

ANALYSIS OF RECENT ACCIDENTS

In 300 accidents recently reported as occurring to longshoremen, of which the greater number were "lumber cases," there has been one fatal, 33 serious hospital cases, 135 serious enough to compel stoppage of work (not more than the waiting period under the compensation act) and 133 of minor importance where the injured workmen continued at his duties. This reads more like the casualty list after a battle than the record of a commercial enterprise, but once again bears out my statement that "gang efficiency" is absolutely necessary in stevedoring operations. Lumber from the West to the East coast of the country, in large quantities, is being handled for the first time by a great many longshoremen and as this work is new the men have not as yet become accustomed to it. The 300 accident cases referred to occurred during the handling of 750,000 tons of general freight and lumber or about 2,500 tons to the accident during the past seven months, or one serious accident to every 23,000 tons of freight handled. When we stop to consider the above figures and the length of time that it took in the olden days to unload 23,000 tons of cargo, I wonder if it is not just possible that the ratio of accidents to the number of tons loaded or unloaded, were not as great as those of today. However, it is gratifying to know that the Marine Section of the National Safety Council is about to organize a campaign for the prevention of accidents to longshore labor and I am sure that their efforts will meet with great success, particularly if we keep ever before us the fact that most accidents are avoidable.

ROLL CALL

Chairman Welch: I would like to get the names of those gentlemen present.

Mr. George A. Marr, Secretary-Treasurer, Lake Carriers' Association, Cleveland, Ohio.

Mr. F. P. Conway, Safety Inspector, Bethlehem Shipbuilding Corporation, Quincy, Mass.

M. C. Goodspeed, Safety Engineer, General Electric Company, Erie, Pa.

Mr. W. G. H. Cam, Safety Engineer, Canada Cement Company.

Mr. A. M. Love, Liberty Mutual Insurance Company, Boston, Mass., District Chief Engineer.

Mr. Frederick S. Titsworth, Attorney, Associate Member of the Society of Naval Architects and Marine Engineers.

Mr. C. F. Kerrigan, Jr., American Steamship Owners' Mutual Protection Indemnity Association, Inc., 49 Wall Street, New York City.

Mr. A. J. Smith, Surveyor, Marine Office of America, New York.

Mr. E. N. Farrior, Safety Engineer, Bethlehem Shipbuilding Corporation, Sparrows Point, Md.

Mr. Guy S. Chesick, Liberty Mutual Insurance Company, Richmond, Va.

DISCUSSION

Mr. A. J. Smith (Marine Office of America): I would like to express a very hearty approval of Mr. Tittsworth's stand relative to the Congressional action and for extending to cargo vessels the safety practices required on passenger vessels—detection particularly. I believe it is a very necessary thing, and the line drawn between passengers and crew should certainly be eliminated. I don't know whether that can be put over in the near future, but I believe it is something that is coming.

I must take exception, however, to his charge of fogysm against the marine insurance companies, at least to the extent that is inferred in his address. The percentage of fire losses ranged from 12 to 15 of the total losses incurred. It is fair to assume this represents the proportion of rate paid against the fire hazard. The rates on fleets, excepting odd tramp vessels that have no fleet ratings, range from 2½ to 5 per cent, and that would bring, even at the maximum, the fire proportion of that to about 75 cents. That is a rate that compares favorably with the shore rates on commercial buildings for fire only.

AMERICAN RATES MEET INTERNATIONAL COMPETITION

The rates of the American companies, generally speaking, meet international competition. Our data is not as complete as the older European, particularly the British underwriting concerns. But we are constantly getting that data together and can quote an intelligent rate based on records. When you appreciate the fact that regardless of any amount of fire equipment that might be put on, an arbitrary amount must be agreed upon on account of hazardous route, running over shoal waters, into hurricane season, etc., which might run a loss ratio of two or three hundred per cent, I believe that the demand for a system of accounts is not altogether unreasonable.

Mr. George A. Marr (Secretary and Treasurer, Lake Carriers' Association): The thought that comes into my mind whenever marine matters are discussed is that they are usually discussed from the standpoint of the maritime interests on the ocean. My connection is solely with the Great Lakes, and as I hope to bring out more clearly tomorrow, it is a segregated industry, highly specialized and as different from the ocean navigation as river navigation or canal navigation.

When Congress legislates in a marine matter its vision is confined the Great Lakes, the small lakes and the rivers. The result is that laws that are inapplicable to the conditions of the Great Lakes are enacted.

The Steamboat Inspection Service is cognizant of these conditions and their regulations are, to a growing extent, being applied to conditions as they exist on the various bodies of water.

Vessel owners on the Great Lakes have formed the Great Lakes Protective Association for the purpose of co-operating with the hull insurance companies in the reduction of accidents and consequent reduction of premiums, which had been growing to an almost prohibitive rate. These rates had grown within a few years from three percent to six percent and seven percent was threatened when this organization was formed.

The plan of operation is for the boat owners to reserve from conventional insurance a small proportion of the hull risk. They started with a 5 per cent. proportion and established rules for navigation and for handling the vessels; and required the reporting of accidents.

The result is the rate is kept down to a minimum by the reduction of losses. The association, by its operations, knew just what it was costing the insurance companies to carry the hull risk on the vessels in this association. They charged the same rate as the insurance companies, and at the end of several years there was an excess contribution which was held in trust and applied to future contributions on the proportion of the risk carried by the association.

This co-operation between the underwriters and the vessel men has brought the insurance rate for hulls down again to 3 $\frac{3}{8}$ per cent., notwithstanding the pressure of operation during the war years when every vessel that could turn a wheel was put in commission and kept in commission steadily. There have been one or two years when disasters have been extremely heavy as, for instance, during the year 1913, when a storm in November wrecked a number of the most modern and largest steel vessels on the Great Lakes, when the rate did not cover the losses.

Mr. F. P. Conway (Bethlehem Shipbuilding Corporation, Quincy, Mass.): When a ship is being built, it requires fire protection as well as when it is put in commission. The fires existing on a ship being built will naturally start from the accumulation of rubbish either in the hull of a ship or elsewhere.

On or near all ships under construction there should be foamite extinguishers in addition to the soda-acid extinguishers, for use in case of an oil fire. The soda-acid can be used wherever there is a fire of rubbish which is not covered with oil. Water barrels should be placed around the ship under the hull with water there so that small fires of that nature might be extinguished immediately upon discovering.

STEVEDORING HAZARDS DISCUSSED

Mr. Guy S. Chesick (Liberty Mutual Insurance Co., Richmond, Va.): One thing that has come to my attention in connection with stevedoring is that there is a high labor turn-over which prevents any kind of organ-

izing in safety work. When such a condition exists what do you recommend as a substitute or as a method for getting around the labor turnover, still using the safety organization method?

Mr. Welch: We keep a record every week, and an inspector will go to the superintendent of the pier, or if necessary, to the insured himself, the contracting stevedore, and lay before him the names of the foreman and the type of accident and tell him we think they are too careless or to get busy with that foreman; we think he is having too many accidents. If it is a poor equipment accident, we immediately go right to the contractor himself and take the matter up. If he doesn't want to co-operate, we don't want him.

Mr. W. G. H. Cam, (Safety Engineer, Canada Cement Company): Would there be any possibility in a large port like New York of organizing stevedoring into sub-sections, each to handle a certain class of work? I think that is the ideal to work toward.

Mr. Welch: Before the war the contractor was in a position to pick a certain type of labor to handle a certain type of cargo. But we are not in that position now. One gang will handle anything that is put up to the hatch for them and we can't prevent it.

WEDNESDAY MORNING SESSION

Chairman Welch: I would like the report of the Nominating Committee. Mr. Titsworth, chairman.

Mr. Titsworth: Your committee feels, on account of the newness of the Marine Section, it would be well to continue with the present officers, and I desire to place in nomination the following :

Chairman, W. E. Welch.

Vice-Chairman, Captain Irving L. Evans.

Secretary, A. A. Close.

For members of the Executive Committee, in addition to the officers:

Mr. Charles H. Potter, President of the Potters Transportation Company.

Captain T. B. Blanchard.

Ellis Knowles, of C. H. Mallory & Company.

I move the election of these officers.

Chairman Welch: I would like to have Mr. Marr act as Chairman pro tem.

Mr. Marr assumes the chair pro tem.

The motion to elect these officers was carried unanimously.

Mr. Titsworth: In view of the fact that there may be some changes during the year on account of death or resignation, I move that the

chairman be authorized to fill such vacancies as may occur, subject to the approval of the executive committee and the managing director of the National Safety Council.

The motion is carried.

Mr. Welch at this point re-assumed the chair.

USES OF THE ALL-PURPOSE CANISTER GAS MASKS ABOARD SHIPS

CAPT. S. M. McBRIDE, ASSISTANT CHIEF OF TECHNICAL DIVISION, CHEMICAL WARFARE SERVICE, WAR DEPARTMENT, WASHINGTON, D. C.

In considering the use of gas masks on board ships to protect against such gases as may be encountered in ordinary service, it is first necessary to determine the nature and occurrence of such gases and second to ascertain what protection is necessary and available.

With reference to the nature of gases that may occur, it may be considered that conditions on board ships are very similar to those of a city, inasmuch as a ship must have practically all of the utilities and conveniences required for normal living conditions. That is, a ship has her stores of food, fuel and other commodities; facilities for cooking, heating, lighting, refrigeration and ventilation; and due to its hazardously isolated position at sea, whereby the ship must rely upon her own resources, it is essential that she be equipped with every necessary safety device to maintain the security of its passengers and crew against all contingencies. Among the foremost of the safety measures is her fire fighting equipment, and the personnel that is charged with the operation of same should be even more amply protected than the firemen of a city fire department and inasmuch as practically all of the gases met in fighting fires on land may be encountered in fires on board ship at sea, it is essential that the seaman be fully equipped with the most improved means of gas protection.

It should be observed, however, that gases may be encountered on board ship at other times than during fires. The nature of the service requires operations which give rise to the generation of certain gases and smokes of a dangerous nature. Cargoes may consist of every known commodity of export and import which, in the event of accident, as well as fire, are sources of danger from this standpoint. Such gases and smokes may originate from accidents to machinery, burning out of electrical insulation, improper combustion of oil in engines and boilers, and many other similar sources.

Acetone, alcohols, aniline, benzene, carbon disulphide, ether, turpentine, naphtha, toluene, etc., enter into the manufacture of rubber, dyes, paints, varnishes, lacquers, shellac, insulation, celluloid, chemicals, and other materials which may be on board as cargo or as part of the ship's equipment, and gases from some or all of the above may be given off in case of fire or accident, while listed below are the more common gases which may be encountered on ship board and against which protection of the ship's personnel should be provided.

**Common Gases Which May Be Encountered on Board Ships,
or Which May Occur in Case of Fire or Accident.**

Kind	Source	Lighter or Heavier than Air
Acid fumes	Storage batteries; acid in cargoes.	Usually heavier
Ammonia	Refrigeration apparatus.	Lighter (0.598)
Carbon bisulphide	Carbon tetrachloride fire extinguisher.	Heavier (1.29)
Carbon dioxide	Product of complete combustion of carbonaceous materials; from chemical fire extinguishers; from fermentation of fruits and other organic substances in cargoes. (Ordinarily not considered dangerous, however, 6 per cent in air produces drowsiness and 20 per cent may produce death.)	Heavier (1.53)
Carbon monoxide	From fires; a product of incomplete combustion; from boiler room furnaces; from spontaneous combustion; fires in coal bunkers and cargoes.	Lighter (.967)
Carbon tetrachloride	From fire extinguishers.	Heavier (1.58)
Carbonyl chloride (Phosgene)	From carbon tetrachloride under special conditions.	Heavier (1.4)
Chlorine	From electrolysis of sea water by flooding of batteries or other electrical connections. From carbon tetrachloride under special conditions.	Heavier (2.49)
Chloroform	Carbon tetrachloride fire extinguishers.	Heavier (1.5)
Chloropicrin	After fumigation (used by some foreign countries as a ship fumigant).	Heavier (1.69)
Cyanogen chloride	After fumigation.	Heavier (2.1)

Kind	Source	Lighter or Heavier than Air
Formaldehyde	After fumigation.	Heavier (1.04)
Gasoline fumes and other products of petroleum	Oil burners; tankers.	Lighter (0.66)
Hydrogen chloride	From carbon tetrachloride.	Heavier (1.269)
Hydrogen cyanide	After fumigation.	Lighter (0.718)
Nitrogen peroxide (Nitrogen dioxide)	From nitric acid in cargoes or other source acting upon organic matter such as wood. (Several men killed at New York dock unloading nitric acid carboys from the fumes produced from the contents of a broken carboy flowing over the wooden floor.)	Heavier (1.58)
Sulphur dioxide	From sulphur burning in air. (Two men overcome wearing ordinary gas masks at New York pier fire where sulphur was burning.) From fire extinguisher systems designed to generate SO_2 , to blanket and extinguish a fire in hold, coal bunkers, etc. Reported to be installed on vessels of 2,000,000 gross tonnage in 1914. Ordinary gas mask gives incomplete protection. Protection afforded by all-purpose mask.	Heavier (2.26)

In protecting against gases on ship board, consideration should be given to the fact that many of the poisonous gases are heavier than air, as shown in the accompanying table, and therefore tend to settle in the hold which forms a convenient receptacle for retaining heavy gases which must be removed by artificial means. In city fire fighting, most of the casualties from gas occur in basements due to the same cause; however, the percentage of space in the hold of a ship is immensely greater than the percentage of volume in the basement of the average city build-

ing, hence it is readily seen that the work of extinguishing a fire on board ship is much more hazardous regarding gas than that of the city fire fighter.

CARBON MONOXIDE ABSORBENTS

Among these gases are a very few that the standard army gas mask will not protect against. Chief among them and the most common as well as the most insidious is carbon monoxide, which is responsible for more deaths in civil life than all other gases combined.

It has no odor, taste, nor color, and it gives no warning of its presence by irritation of the eyes or throat.

It is a product of fires due to incomplete combustion of carbonaceous materials, from furnaces, and other similar sources, and is most liable to occur in dangerous quantities on ship board from smoldering fires in cargoes in holds, coal bunkers, etc.

The "All-Purpose" Gas Mask Developed by the Chemical Warfare Service of the United States Army During the World War. This Mask Is Designed to Protect the Wearer Against Acid Gases, Organic Vapors, Ammonia and Carbon Monoxide. It Also Protects Against Smoke, Coal and Other Dusts.



Carbon monoxide was not used as a war gas, due to certain physical and chemical characteristics. No provision was made during the war to develop a gas mask absorbent to protect against it as a war gas. There was, however, a demand for such an absorbent for use by the U. S. Navy in submarine and in the gun turrets of battleships, and this demand was filled by the development of carbon monoxide mask at the American University Experiment Station of the Chemical Warfare Service during 1917 and 1918.

This absorbent, known as Hopcalite, acts catalytically on carbon monoxide (CO), causing combination with the oxygen of the air to form

carbon dioxide (CO_2), which may be breathed to the extent of two or three per cent without harmful results, whereas about one-half of one per cent of carbon monoxide would be fatal.

AMMONIA ABSORBENTS

Ammonia is another common gas against which no special protection was provided in the standard army gas mask. This gas is met with only in industrial work, principally around refrigeration plants.

There was a commercial demand, however, for a gas mask that would give adequate protection against ammonia fumes, and an early means of protection was by the use of pumice stone impregnated with sulphuric acid. This had many disadvantages and was superseded by the development of pumice impregnated with copper sulfate and known as Kupramite.

Silica gel, which has been known for some years, has been developed to a state where it gives adequate protection against ammonia as a gas mask absorbent.

With these developments available, the Bureau of Mines designed a gas mask to give protection against all noxious gases met with in ordinary industrial, chemical and metallurgical practice and for use by firemen of city fire departments. This mask is known as the "Universal" gas mask. A short time later the Chemical Warfare Service was called upon to furnish such a mask for use by various government departments and this mask also uses Hopcalite to give protection against carbon monoxide, but uses pumice impregnated with cobaltous chloride, another Chemical Warfare Service development, instead of silica gel, as an ammonia absorbent. This mask is known as the All-Purpose Mask.

There is also a commercial mask manufactured which embodies the above principles and is known as the All-Service mask.

The construction and operation of all of the foregoing masks are similar and reference herein to the All-Purpose mask applies to the three types, unless otherwise specifically mentioned.

GASES FROM FUMIGATION

Another common source of danger from gases aboard ship is from those remaining after fumigation.

The following is from the July 6, 1923, Report of the U. S. Public Health Service on Ventilation of Ships after Fumigation with Poisonous Gases:

"It has been noted that shut-in spaces, with little or even almost no provision for ventilation, exist on most ships. Often such spaces are difficult of access. It has occurred that from known and, at times, unknown causes, gas remained or accumulated in certain spaces below. It may be that the gas was not properly eliminated because of lack of ventilating facilities, or that it condensed in contact with cool objects and diffused after the time when the hold was believed to be clear; and there may have been instances when the gas was absorbed by the cargo, or by the bilge water, and subsequently liberated."

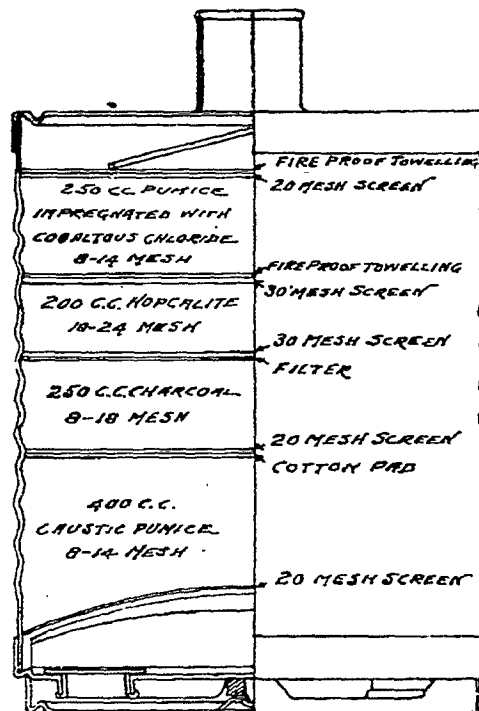
The U. S. Public Health Service recently has adopted a new method of ship fumigation, consisting of the generation in place of a mixture of cyanogen chloride and hydrogen cyanide. Bilge water will absorb about 100 milligrams of cyanogen chloride per liter for an exposed surface of 27 square inches.

Cyanogen chloride will condense on brass at the rate of 42 milligrams per 1,000 square inches of surface, and on steel at the rate of 125 milligrams per 1,000 square inches, at an average temperature of $54\frac{1}{2}^{\circ}$ F.

These figures are given only for the purpose of showing that the gas may be present in bilge water, and will condense into a liquid on cold metal, hence it is quite liable to be present after fumigation. The time the gas may remain and the amount present will depend upon several factors, such as the total quantity absorbed by the bilge water and the total amount condensed; temperature at time of fumigation and temperature subsequent to clearing of gas; extent of and time at which bilge water may be agitated by any means whereby the absorbed gas will be released.

The foregoing is cited to show the necessity of caution in entering any closed space or compartment for some time after fumigation, especially where the ventilation may be poor, without the protection of a gas mask.

Section View of the Canister Used in the "All-Purpose" Gas Mask, Showing the Various Sections of Pumice, Hopcalite and Charcoal Through Which the Gas Filled Air Is Sucked by the Wearer of the Mask.



GASOLINE AND PETROLEUM

Gasoline and other petroleum vapors are more dangerous than commonly supposed, aside from their inflammable and explosive nature. Due to their low boiling points these liquids evaporate rapidly upon exposure to air, the rate of evaporation increasing with the temperature.

An empty gasoline or oil tank will give off dangerous fumes and there is usually a small quantity of the liquid left in the bottom of the tanks even after steaming or other means of cleaning has been resorted to, and the remaining sludge when stirred up in cleaning or making inspection or repairs on a tank will give off dangerous quantities of gas. The inhalation of benzene, gasoline and other petroleum vapors causes headache, dizziness and frequently an intoxication in which the person becomes excited and hysterical. Higher concentrations quickly overcome the victim and cause complete insensibility and occasionally death.

All such tanks should be entered with extreme caution, and seldom, if ever, without some means of protection.

The All-Purpose Gas Mask will give protection against these vapors for a short time only, the time depending upon the concentration of the gas present, but to be safe one should not remain in such a tank with a gas mask over five or ten minutes at a time. If a longer period is required to perform the work, the workman should go out and change masks. It has been found that thin rubber and rubberized cloth are permeable to gasoline and similar vapors, hence the used mask should be thoroughly aired to permit the occluded gas to dissipate before the mask is again used.

The safest protection to use in entering such tanks is either the oxygen breathing apparatus of the type approved for protection against penetration by gasoline vapors, or the hose mask, which consists of a gas mask face-piece of the Tissot type with a hose attached which leads to fresh air. Both of the above mentioned types of equipment are now available commercially.

In any event a tank should never be entered without having a stout rope attached to the person so that he can be removed if overcome. A number of deaths have occurred due to a neglect of this precautionary measure.

The sub-committee of the Marine Hazards Committee of the National Fire Protection Association formulated "Tentative Rules for Freeing Oil Tanks of Vapors Before Entering," as published in the National Petroleum News of November 16, 1921, (pp. 57-58), in which it recommends the use of the hose mask, or the use of oxygen breathing apparatus for a period of not more than 20 minutes, after which it shall be aired in fresh air for not less than six hours before further use. They stipulate that gas masks of the Army type shall not be used.

In this connection, however, it may be stated that in an emergency any gas mask containing charcoal, and all gas masks contain some in varying amounts, will give protection for a few minutes.

FIRE EXTINGUISHERS

Chemical fire extinguishers, especially those of the carbon tetrachloride type, should be used in close spaces and small compartments only when protected by a gas mask, due to the considerable number of toxic gases evolved by action of the heat of the fire or heated surfaces on the constituents of the extinguisher liquid. The basic gas is, of necessity, heavy in order to blanket the fire and cut off the supply of oxygen, hence is not easily dissipated and becomes a source of danger in confined spaces.

COAL GASES

Gases and dusts emanating from fires in cargo and bunker coal or as an after-result of explosions, require a means of gas protection. Such fires frequently originate from spontaneous combustion and the gases occurring therefrom may be of such a complex nature that it is desirable for men to be equipped with gas masks before entering into that part of the ship where such fires exist, in order that the risk of their being overcome may be reduced to a minimum.

As an example of this may be cited an explosion occurring on the steamship "Adriatic" August 11, 1922, which was carrying about 500 tons of coal in the hold adjacent to the coal bunkers. No evidence of gas was detected previous to the explosion but upon opening the doors between the bunker hold and the cargo hold the day after the explosion a "strange" gas was noted, which had a peculiar odor, produced a choking effect. Gave the workmen a great desire to drink water, and made them light headed.

This was probably carbon dioxide confined in the bunker after the explosion and mixed with other coal gases which were given off as a result of the explosion.

Two analyses of the gas from samples of the coal, made by the Bureau of Mines, showed two and three per cent carbon dioxide. It is interesting to note that the analyses showed 12 per cent and 39 per cent methane (marsh gas or fire damp) in addition to the various other gases.

There is no adequate absorbent for methane known for use in gas masks. However, this gas is harmless in itself but may cause suffocation when present in sufficient quantities to reduce the oxygen content of the air below 13 per cent. A gas mask should never be worn in an atmosphere deficient in oxygen; hence, as the gas is otherwise harmless, it requires no protection from this standpoint.

If such a case should exist on board ship then an oxygen apparatus or hose mask should be used.

SMOKE AND DUST

The choking and irritating effect of smoke, due to the finely divided particles of soot and tar, dust and certain smoke vapors, on the eyes, throat and lungs may easily disqualify a person from performing effective work if not protected with a mask, although the quantity of such substances present may not be sufficient to produce toxic effects. These originate from many causes besides fires but all are efficiently removed by suitable filters in the canister.

THE ALL-PURPOSE GAS MASK

The All-Purpose Gas Mask consists of three principal parts, the face-piece, the canister and the carrier.

The face-piece is of the Tissot type, without nose clip or mouth-piece, is made of rubber stockinette, shaped to closely conform to the configuration of the face and made in five sizes to accommodate varying facial characteristics. Adjustable bands form a head harness which holds the mask firmly and comfortably in place.

Purified air from the canister enters the face-piece through a corrugated flexible tube attached to a metal angle tube in the face-piece. Attached to the angle tube on the inside of the face-piece is a rubber deflector which distributes the incoming air over the lenses of the eye-pieces to prevent dimming due to condensation of moisture on the glass. Expired air is exhaled directly to the atmosphere through a rubber flutter valve attached to a separate opening through the angle tube.



Hose Mask Developed by the United States Bureau of Mines for Use in Mine Rescue Work. This Mask Carries no Canister, the Wearer Being Supplied With Fresh Air Through a Hose Which Extends to an Air Pump Outside the Gaseous Area.

The canister is a modification of the present army type. In the bottom are two inlet valves opening into a dome made of perforated metal to permit even distribution of the air to the absorbent material.

A heavy wire spring and screen in the top of the canister press against the chemical filling to hold it in place and to prevent the passage of air along the sides of the canister.

The canister filling consists of the following absorbents arranged in the container in the same order as shown; the caustic pumice on the bottom and the pumice impregnated with cobaltous chloride at the top, the incoming air passing through the series of absorbents from the bottom upward:

Absorbents	Protect Against
250 cc. Pumice impregnated with cobaltous chloride	Ammonia
200 cc. Hopcalite	Carbon monoxide
Filter:	Smokes, coal and other dusts
250 cc. Activated Charcoal	Organic vapors, such as: acetone, alcohols, aniline, benzene, carbon bisulphide, carbon tetrachloride, chloroform, ether, formaldehyde, gasoline, petroleum, distillates, toluene, and others.
400 cc. Caustic Pumice	Acid gases, such as: carbon dioxide, chlorine formic acid, hydrogen chloride, hydrogen cyanide, hydrogen sulphite, nitrogen peroxide, phosgene, sulphur dioxide, and other gases of like chemical properties. Caustic pumice also extracts water vapor from the air to prevent its contaminating and inhibiting the Hopcalite.

A rubber or metal check valve is placed between the two lengths of corrugated tubing connecting the canister to the face-piece to prevent the moisture of the exhaled air leaking back into the canister and deteriorating the chemical filling, especially the Hopcalite.

Canisters of the all-purpose mask are painted red, in accordance with the Bureau of Mines specifications to designate a universal service canister.

The carrier of the all-purpose mask is the new Army side carrier, carried in one position under the left arm, supported by shoulder and waist straps. The Universal and All-Service masks are carried on the chest, without a case, being held in position by neck and waist straps.

The breathing resistance of the canister is about 50 mm. (2 inches) of water at a flow of 85 liters (about 5 cubic feet) of air per minute.

LIFE OF CANISTER

The life of the canister depends upon a number of variable conditions, such as the concentration of the gas in which the canister is used, the rate of flow of air through the canister, which is proportional to the rate or extent of exertion or work done by the wearer, the temperature and humidity of the air, etc. Under ordinary conditions and concentrations, the canister has a life of from four to six hours of continuous use.

All gases except carbon monoxide may be detected by odor when the canister "breaks," that is, permits gases to pass through, however, the canister gives protection beyond this point and permits the wearer to withdraw to a safe atmosphere and change masks or canisters.

Carbon monoxide gives no warning when the canister "breaks"; hence, the safe life of the type of canister used must be known beforehand and the mask not worn longer than the prescribed period.

Moisture in the air causes deterioration of the Hopcalite; hence, its life is limited by the amount of air breathed through the canister regardless of whether carbon monoxide is present or not and the life of the canister is limited by the time it is actually worn. This may be determined by keeping a record of hours worn, or by a mechanical device which measures the quantity of air that has passed through the canister. Such a device, known as a "timer" is furnished with the all-service mask as manufactured for commercial use.

LIMITATIONS OF USE

It is to be noted that gas masks, in general, give protection by absorbing, neutralizing and filtering out the harmful ingredients of an atmosphere and allowing the purified air to be breathed. The gas mask does not supply any oxygen as in the oxygen breathing apparatus. The wearer of a gas mask must depend solely upon an adequate supply of oxygen in the atmosphere in which the mask is worn. If the oxygen content of the air is below 13 per cent it will not support human life and a flame is extinguished when the oxygen content falls to 16 or 17 per cent. This is a safe guide to the use of a gas mask and an atmosphere that does not maintain a safety lamp flame must never be entered with a gas mask.

EQUIPMENT REQUIRED, STORAGE, CARE AND USE

The number of all-purpose gas masks required for ship equipment will vary with the size of the ship and the nature of the service in which the ship is operating, however, it may be closely estimated by the extent of the fire fighting equipment as there should be a sufficient number available to equip all men required to go into any part of the ship in case of a serious fire.

Masks should be maintained with the fire equipment for immediate use and a number held in reserve for replacement or for use by rescuers in case of an accident to those in a dangerous atmosphere.

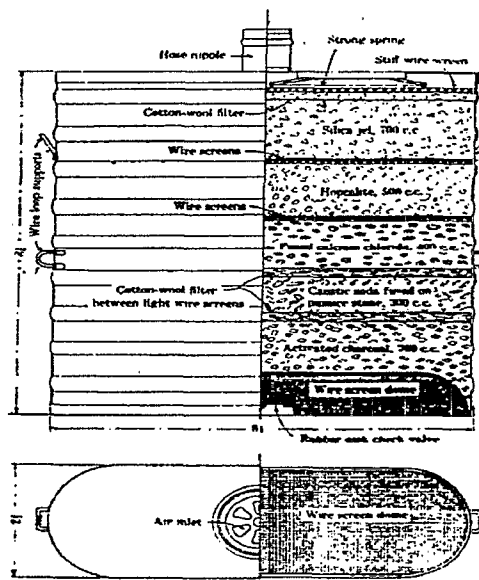
Masks should be so distributed that regardless of where a fire may occur or an accident happen, masks and extra canisters will be available.

There should be at least one gas mask with each chemical fire apparatus or extinguisher of any type.

Extra masks should be maintained adjacent to ammonia refrigerating equipment; in boiler rooms or available for use in same; in such parts of the ship in which the personnel would become affected in the event of suspension of ventilation, and a number sufficient to equip all personnel required to enter any closed compartment or confined space immediately after the ship has been fumigated.

Extra canisters should be maintained to the extent necessary to provide against any emergency which might be encountered, consistent with the nature of the service and consideration should be given in this connection to the duration of the voyage with a view to replacing worn-out canisters upon return to home port.

Canister Composition of the "Universal" Gas Mask Which Was Designed by the United States Bureau of Mines for Protection Against All Noxious Gases Met With in Ordinary Industrial, Chemical and Metallurgical Practice.



Gas Masks should be kept where the canister will be dry but not in a place where the rubber parts will deteriorate, such as adjacent to steam pipes or other places of high temperature.

Extra canisters should be kept hermetically sealed as when received and in dry, cool storage. Unused canisters so maintained will last for several years.

The gas mask requires very little attention and is simple to use. In putting the mask on, the one principal operation is in the adjustment of the face-piece. This is accomplished by holding the face-piece in both hands in front of the face, with the thumbs up and inside of the bands

of the head harness; thrust the chin up and out, with the head thrown back; pull the face-piece up under the chin and slip the head harness up over the head as the face-piece comes into place.

Run the fingers under the head harness and the edge of the face-piece to assure a smooth, tight, comfortable fit.

SPECIAL EQUIPMENT

The All-Purpose mask has a wide field of usefulness on board ship; it is simple, light, requires no special training to use, is comparatively inexpensive and gives a wide range of protection with the exceptions noted herein.

For those exceptional cases oxygen breathing apparatus, the hose mask, or both should be maintained.

The present gas mask is much lighter and more convenient and comfortable than any other type of equipment of this nature now in use, yet it is believed that within the near future this will be still further improved as the Chemical Warfare Service, the Bureau of Mines and commercial concerns are constantly working on improvements. The Chemical Warfare Service has recently developed a communicating type of mask in which the wearer may talk almost as freely as without a mask, thereby enabling conversation between workers, the use of the telephone, voice tubes, etc. This feature is also incorporated in a new type of mask with a self-contained canister and face-piece whereby the appended breathing tube and canister are eliminated, facilitating the use of the gas mask in places where these are now a hindrance. The canister of this mask is valveless and can be removed and replaced with a new canister in a few seconds.

The Bureau of Mines, in co-operation with the Chemical Warfare Service, is engaged in the development of a more highly activated and retentive charcoal for gas mask use which, if successful, will materially reduce the size of the canister.

It is hoped that in the interest of national safety and national defense that further achievements will be forthcoming within the year.

THE NEED AND FUNCTIONS OF SHIP SAFETY COMMITTEES

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To adequately portray "The Need and Function of Ship Safety Committees" as established on lake ships one must historically sketch a commerce that is without counterpart.

Many people not identified with the industry of the Great Lakes, and particularly those not residing in the region contiguous to these waters, have slight conception of the magnitude of this commerce, of the celerity with which it is handled, or of the equipment that has been evolved for meeting a coarse freight movement that has grown from one of perhaps 10 million tons since the advent of the steel bulk freight steamers to a

present time movement of more than 100,000,000 tons. Some idea of the magnitude of this trade may be gleaned when I tell you that the freight movement through the St. Marys Falls Canals, which handle about three-fourths of the through traffic of the Great Lakes, in the month of July alone amounted to 14,388,908 net tons. This compares with a total of 19,567,875 tons of cargo that passed through the Panama Canal during the twelve months ending June 30, 1923, which was a record breaking year. In August of this year our fleet moved 14,353,044 tons through the locks at Sault, and the June movement was 13,749,923 tons, thus making a total of 47,706,706 tons moved through this single waterway in the trade to and from Lake Superior in the three months' period, and leaving out of the calculation the large movement between Lake Michigan and the lower lakes. When you know that the combined traffic of the Panama and Suez canals for the 365 days of the past fiscal year amounted to 40,927,875 net tons, the vastness of our lake trade and the speed at which it is negotiated can well be visualized. As I said before, the commerce of the Great Lakes in coarse freight alone, i.e., iron ore, coal, grain and stone, will exceed one hundred million tons, and as the lakes are locked in the grasp of winter from December to April, this traffic has to be transported in a season of approximately eight months. If I have gone into rather complete detail, it has been to set forth the amount of freight that has to be carried in a short period with resultant pressure and strain upon vessel operations and personnel, and to emphasize the small number of personal injuries actually occurring in a field which might be very fertile.

A SPECIALIZED FIELD

I should also like to dwell for a moment upon the unparalleled specialization of the conditions that surround our lake trade and that have grown up since the great ore fields in the Lake Superior district came under development. To handle the increasingly large ore tonnage which, since the advent of the steel steamer in 1886, has grown from 3,559,230 gross tons to a movement of 64,734,195 gross tons in 1916; to provide for a reverse movement of 25 to 30 million tons of coal to move something like 7 million tons of stone and to bring to points near to the seaboard the grain crops of the West and Northwest which in the year 1922 exceeded a half billion bushels, required vessels of great capacity and so constructed as to permit a rapid loading and unloading. It was to meet these requirements that a distinctive type of steamboat has been evolved—the bulk freighter. Openly constructed to permit free action of loading and unloading rigs, with the machinery aft to permit almost uninterrupted cargo space, the new and larger vessels of this type are 400 feet overall length, 60 feet breadth of beam and 32 feet molded depth. Their cargo space is over 400 feet in length. Thirty-five hatches 9 by 42 feet, spaced 12 foot centers, open into the hold, virtually converting the vessel into an open trench during the process of loading or unloading, leaving working space on deck restricted to three foot strips athwartship between the hatches and a nine foot

strip along the sides of the vessel, more or less encumbered with fittings. The bulk freighter of this type frequently carries 13,000 gross tons of ore, 14,000 net tons of coal or 450,000 bushels of wheat.

With the introduction and growth of the bulk freight type of vessel, loading and unloading equipment to meet the demands of the trade have undergone a corresponding development and have so accurately kept pace that with perfect conditions we have seen a cargo of 12,500 gross tons of ore loaded into a vessel in 16½ minutes, and the same cargo unloaded in three hours and five minutes, or at the rate of 4,056⅔ tons an hour. Of course the average rate of loading is not nearly so fast, but we have seen in the regular course of the trade 14,245 tons of bituminous coal loaded in 4½ hours and 10,073 tons of coal unloaded from a lake steamer in 7 hours and 55 minutes.

DISTINCT PROBLEMS OF LAKE TRANSPORTATION

As a forerunner to the vexatious problems that were to be encountered in establishing a workable system of Safety aboard lake steamships, I have mentioned these facts to illustrate the achievements attained in point of volume of traffic moved and rapidity and efficiency of handling, the like of which does not exist elsewhere in the world. It is natural that a trade so unique would call for measures equally original in plan and process of operation, and this is precisely what has occurred in establishing a cohesive system of Safety work easily understandable by those seamen upon whom the burden of the work devolved and which could function practically and sensibly aboard ship.

The vessel membership of the Lake Carriers' Association has ranged from 350 to 410 steamers and 23 steel barges of average steamer size. The personnel of this fleet will number at any one time 12,500 officers and men, without allowance for turnover. The available man power in the course of the season will total approximately 25,000 different individuals. To a large extent, the great body of lake seamen is made up of steady-working, reliable young men who "follow" the lakes year after year and are representative types of fine young Americans. Nevertheless, there is naturally a large element of inexperienced men constantly employed upon these vessels. From its inception, the Lake Carriers' Association has sought to do the best that it could for the men employed aboard the ships enrolled in its membership. The lake trade, segregated and complete within itself, has nothing in common with industry in general, nor much indeed, with even the maritime industry of the rivers and oceans, where in either case the conditions of operation and the character of trade and vessels vary so distinctly from those of the lakes, that we are cut off from active participation with other interests in practically every movement. The lake business exceeds in a navigation season of about eight months one hundred million tons. On an average haul taken at 800 miles, the ton mileage service exceeds one-fourth that of all the railroads in this country. What our Association has done toward the welfare of the men has been accomplished through the Welfare Committee consisting of nine vessel operators, to sub-committees of whom are assigned the several features

of the welfare work such as health, education, thrift, and safety of the men who man the ships. It has therefore devolved upon our membership to depend upon their own ingenuity for the solution of the problem and the mastery of the tasks that are so peculiarly their own.

From what I have related of the lake trade, the fleet, the method of quick operations and the army of men employed, it is at once apparent that a method of Safety effort such as employed on railroads, in factories, mills or elsewhere ashore would be utterly impossible to effectively employ on shipboard. Lake ships load and unload at twelve ports on Lake Erie and at eleven ports on the upper lakes. With the facilities at hand for the quick taking of or discharging of cargo, the average stay in port is a matter of a few hours at the most. This situation precluded any possibility of establishing Safety work on board our boats under the conduct of men skilled in promoting or supervising such work. Moreover it precluded the possibility of establishing a plan which could come under even casual observation, the chaff separated, and the good commended and spurred on to greater effort. The need of a work of this kind had long been recognized but for many years each vessel owner had pursued it in his own way, some with more or less success. But without coordination in the face of the constant shifting of men from fleet to fleet and boat to boat, the measures taken to instill a spirit of self-protection and protection to shipmates among upwards of 20,000 men was never characterized by more than half-hearted effort by the crews.

SHIP SAFETY COMMITTEES ESTABLISHED

In 1917 a plan of a Ship Safety Committee was conceived that possessed a marked ingenuity and originality. The plan provided for the appointment on each vessel of a Ship Safety Committee to consist of six members of the crew, three from the forward or navigating end of the vessel, and three from the after end or engineer's department, the selection of men to consist of the lowest licensed officer on each end of the ship, two unlicensed men from the deck crew and two from the engineer's department, but not more than one of any rating or grade. The master appoints one licensed officer to act as chairman, the other as secretary. Thus the personnel of the Ship Safety Committee on the largest steamships would be as follows: Second mate; second assistant engineer, one as chairman the other as secretary; boatswain, deckhand, handyman, fireman or oiler. On smaller steamers the personnel would be second mate, wheelsman, deckhand, assistant engineer, oiler, and fireman or coalpasser. It will be noted that the chief officers of the ships are not designated to serve on the committee, the purpose being to place upon the men who actually do the work the duty of studying and correcting the hazards and to enlist the interest of the rank and file of the unlicensed men. The psychology of this is obvious. I would be remiss if I failed to acknowledge the valuable assistance of the masters and chief engineers of the lake fleet in establishing Ship Safety Committees. While not members of the committees, they generally attend the committee meetings, lending advice and encouragement.

The Ship Safety Committee being required to hold a meeting once each month, compensation for each member was fixed at \$2 for each meeting attended, with a bonus of \$10 additional to be paid at the end of the season provided the member attended all meetings, but not less than six meetings held during the navigating season, and further provided that no personal injury occurred on the ship or to a member of the ship's company in connection with his duties, sufficient to cause him to leave the ship. Pads of printed forms for recording the minutes of the meetings are supplied to the ships, one copy of which is sent to the vessel manager and another to the Lake Carriers' Association.

Seamen the world over are skeptical of new ideas, but once convinced that a thing has been provided for their benefit, their appreciation is deep and lasting—and they work faithfully for the cause. Their skepticism proved a small stumbling block in the establishing of the Ship Safety Committee aboard the ship. I am not unmindful of the fact, however, that operating conditions rendered it impossible for us to go aboard the ships and explain in detail to each set of six men the object of the committee and method of procedure and the province of their work. On the other hand, they had to organize and act on their own initiative, and being sailor men and not Safety experts, it was not their fault if they failed to grasp the subject matter at the outset and if in consequence the results were unsatisfactory at the beginning.

After trying out the Ship Safety Committee on some of the ships in the fall of 1917, the plan was actively started at the opening of navigation in 1918 when the owners of 137 steamers in the membership of the Association authorized their masters to organize committees. Briefly, the duties of the Ship Safety Committee were: Give special thought and attention to the details of operation in each member's department as shall further the general safety of the crew and others on shipboard; familiarize themselves with the recommendations made by the Industrial Committee; to hold a meeting once every month and carry out such steps as they might find advisable or have authority to carry out. With Ship Safety Committees functioning on 137 steamers and with six members to a committee this made at least 822 men constantly and seriously advocating the principles of Safety on shipboard. Although the work was new and the men had to work out their own methods, the committees were not long in finding themselves and good results obtained before the season was half over. As the season advanced and the reports covering personal injuries came in in diminished numbers in comparison with preceding years, it became clear to the Welfare Committee that at last the right chord had been struck.

ACCIDENT REPORTS IMPORTANT

It has been the custom for all masters to report in detail to the Lake Carriers' Association personal injuries sustained by members of the crew. As a result we receive and are cognizant of scores of injuries of such minor importance that in other industries are considered too trivial to record. The Lake Carriers' Association publishes during the navigation season a

monthly magazine of 24 pages known as *The Bulletin* and which is distributed freely through the several departments of every ship in the membership. Particular care is exercised to monthly publish a list of current personal injuries which receive earnest deliberation in Ship Safety Committee meetings with means taken to prevent recurrences. On ships where committees do not prevail these reports of personal injuries are read over by members of the crew and thus they serve a useful purpose throughout the entire fleet. In *The Bulletin* we publish a digest of noteworthy suggestions that develop in committee meetings for the general benefit.

For many years the Lake Carriers' Association has maintained an Industrial Committee composed of masters and chief engineers who in winter sessions make recommendations for the prevention of personal injuries. Inasmuch as the members of this Committee are men of extensive and intimate experience with the operation of vessels, their recommendations served as the basis of our accident prevention effort for a number of years. These recommendations, together with the proposed plan of the Ship Safety Committee were incorporated in a pamphlet which proved invaluable as a compendium for the Ship Safety Committee in its meetings and daily work.

Previous to the advent of the Ship Safety Committees, the field of the Industrial Committee was limited to the personal observations of the members of the Committee or to the suggestions or complaints of other masters, chief engineers or persons identified with lake commerce, and the examination of the personal injury reports that had been received during the year. The meeting reports of the Ship Safety Committees have given the Industrial Committee an additional source of information and they have found many suggestions worthy of endorsement by them to the Executive Committee of the Lake Carriers' Association whose adoption translated them into mandatory rules.

TRAINING THEM TO THINK SAFETY

Naturally many of the suggestions originating with the Ship Safety Committee are of purely local application to conditions that exist upon the vessels where the suggestions originate. It is also true that the vast majority of the suggestions are impracticable. Yet who can gainsay the moral and practical value of having so large a number of men, comprising the actual working element aboard ship, constantly thinking in terms of safety, observing their own faults, criticising the improper methods of others and noting the conditions of fittings and equipment that may be conducive to accident? These men are unconsciously forming habits of thought and observation along these lines and are as unconsciously communicating the habit to their shipmates.

Some committees have furnished well executed sketches of appliances invented aboard ship for the prevention of personal injuries, the most meritorious of which included snubbing posts for mooring the lines of the mail boats in the Detroit River; a device for safeguarding the men at work on the hatch covers and a device for use in the firehold for the

prevention of burns. Three different styles of landing pole have been invented by the men on shipboard and this device is now in rather general use. The landing pole is a boom so constructed that it can be swung outboard ten or twelve feet and a man lowered to the dock in a "bos'n's chair" to handle lines when making a landing. Men going down from ship to dock on a line or on a Jacob's ladder do so with peril.

In 1919 Ship Safety Committees were in operation on 258 steamers, which meant an increase to 1548 men aboard ship pledged to the responsibility of constantly advocating the principles of Safety First. In 1920 meeting reports were received from only 183 steamers, whereas committees should have been employed on 261 ships. However, the number of reports received rose to a total of 880 and in addition to this increased regularity in the holding of meetings it is of interest to point out that statements of the deliberations were more comprehensive, reflecting a clearer conception of their duties.

In 1921, the year of the general depression, only half of our fleet operated, and much of that on part time, so I will pass that season without comment beyond stating that on the steamers which sailed the work was continued as unremittingly as possible under the circumstances. It is probable that this break in vessel operation had its effect in the decreased number of 173 steamers that employed committees in 1922, but the total number of meetings held was increased to 899 as compared with 654 reports received from the peak number of 258 steamers in 1919.

This year I have had reports from 194 steamers. I should add here I do not believe we have had in any season a complete record of the number of ships being served with Ship Safety Committees or complete reports of all meetings held. As a matter of fact, committees are authorized on 231 steamers this season though reports have been received from only 194, but there is still some educational work to be done to bring about complete and uniform cooperation.

SOME HAZARDS OF NAVIGATION

The hazard of personal injury aboard a bulk freighter is not nearly as great as on railroads or in mills. All dangerous places on deck, in cargo hold, dark hold, and around machinery are amply protected by guards and metal warning signs are freely posted in all necessary places. The percentage of unavoidable accidents aboard ship is small, indeed. I know of only one of serious nature likely to happen and that is when a cable may part and someone happen to be directly in its path, but cables seldom part. In the engine room, serious unavoidable injury can be sustained only when a part of the machinery lets go, and that seldom occurs. In the boiler room steam pipes may break, tubes, staybolts or other parts of the boiler may let go, and there may be back drive from the furnace, to cause serious injuries, but aside from these, personal injuries sustained aboard ship are usually avoidable, and I venture to say that 99 per cent are due to pure carelessness, heedlessness of repeated warnings or lapses of memory. Until recent years the greatest source of fatal or serious in-

juries on deck, falling through an open hatch into the cargo hold, entanglement of leg or arm in the bight of a cable, and in the engine department by having hands caught while feeling or oiling machinery.

It is certain that the number of serious personal injuries has been greatly diminished. Of material significance is the fact that fatal injuries or total disablements sustained on deck have been largely curtailed. I desire to call particular attention to these for the reason that fatal injuries of this character are avoidable. Falling into an empty cargo hold is the most dreaded and for a long time was the most common of all our fatal injuries. I cannot recall a single case of falling into the hold that was unavoidable. On the contrary, some have been due to carelessness as the result of tripping, but more frequently to a lapse of memory when men stepped backward into the hold. Some have fallen into the hold by walking on the hatch covers when they were partly open. Drownings as the result of tripping and falling overboard and fatal injuries sustained by tripping and falling from deck to dock once levied a heavy toll.

WHAT SAFETY COMMITTEES HAVE ACCOMPLISHED

To show the extent to which fatal injuries sustained on deck have been diminished I present the record for the past ten years, divided into two periods, as follows:

FIVE YEAR PERIOD PRECEDING SHIP SAFETY COMMITTEES

	Fell into Cargo Hold	Fell Over- board or from Docks	Fell from Spars or Ladders	Total Disable- ments	Total Fatal Accidents	Death Benefits
1913	5	7	3	0	15	\$1,400
1914	6	0	0	0	6	1,175
1915	2	9	1	1	13	1,100
1916	3	10	3	1	17	1,900
1917	5	7	0	1	13	1,150
Totals	21	33	7	3	64	\$6,725

FIVE YEAR PERIOD OF SHIP SAFETY COMMITTEES

1918	3	1	0	0	\$ 375
1919	2	2	1	0	700
1920	2	0	0	0	175
1921	2	0	1	0	250
1922	3	1	2	2	775
Totals	12	4	4	2	\$2,375

A summary reveals 21 fatal injuries from falling into the cargo hold during the five years preceding the establishing of Ship Safety Committees as against 12 in the five year period of Ship Safety Committee meetings; 33 from falling overboard or from docks while handling cables, as against four; 7 from falling from spars or ladders, as against 4; and three total disablements as against two, making a total of 64 as against 22. Death benefits paid to the beneficiaries of these unfortunates amounted to a total

of \$6,725 as against \$2,375. A further comparison of the number of accidents between vessels having committees and those not entering into this plan, reveals that during the current year there have been on non-committee vessels 59 accidents and on committee boats but 45. The classification of these accidents is as follows:

	No Committee	Committee
Working on machinery	12	6
Cleaning fires and firehold work.....	14	6
Slipping and falling on deck, in rooms, etc.....	8	6
Miscellaneous accidents and work.....	10	11
Handling hatches	4	5
Falling from ladders, staging, etc.....	4	4
Falling ore, coal, etc.....	0	2
Handling lines	6	3
Falling into hold	0	2
	59	45

Only three fatal injuries have been reported so far this season. In one, the seaman who, acting contrary to instructions by failing to wait for a ladder to be lowered, fell from the side of a boat; in the second, the seaman fell off the dock and was drowned, and in the third, a fall down a stairway. No deaths have occurred so far this year from falling into cargo hold or overboard, or from spars or ladders.

Many steamers now pass through a season of navigation without having sustained a single personal injury and in the fleet as a whole the number of serious injuries has been greatly diminished. Highly significant in this connection is the fact that in addition to the decreased number of personal injuries entailing expense to the vessel owners, the Protection and Indemnity insurance rate has remained stationary through a number of years. A further important factor which should not be overlooked is to be found in the consistency with which the seamen stick to their boats in order to serve out the season on the Ship Safety Committee. All vessel operators recognize the value of a steady-working seaman. We now have Ship Safety Committees that go through the full season of navigation without change of personnel. We feel that the Ship Safety Committees keenly sense their responsibilities and faithfully and conscientiously discharge their duties as they see them, both in committee or when performing their daily ship's work. At the start, they reluctantly served on the committees, now, they are eager to be members, many of them without regard for compensation.

INFLUENCE OF COMMITTEES

Moreover, they inspire others in the crew to be watchful of shipmates. Only a few days ago I learned of an oiler, not a member, who, off duty, saw a green man come aboard and he forthwith took this man over the deck pointing out places of danger. I have also been impressed with another recent development, having noticed in several reports where Ship

Safety Committees recommend the discharge of the habitually careless men and the ones who stubbornly refuse to do things in a safe way after having been shown.

Experience has taught the members instead of centering their thoughts, as in the beginning, on altered ship construction or equipment as a means of preventing injuries, to work along constructive lines. By taking precautionary measures well in advance they anticipate the dangers to be encountered during the dangerous periods, such as drowning while swimming during the hot period, and injuries as a result of stress of weather during the late fall.

I believe the outstanding feature that has come out of the Ship Safety Committee is the increasingly large demand for lights—cluster lights forward and aft on deck to facilitate the safe taking off or putting on of hatches, lights to prevent falling into the cargo hold, lights to handle mooring cables on the dock, and lights to facilitate the landing of men from ship to dock. Also more lights in dark places below deck and particularly electric lights in the paint and lamp rooms instead of lanterns. A few years ago there was no such demand for additional illumination. The men took their chances in black nights and in dark places. It is noticeable, too, that the Ship Safety Committees are no longer backward in setting forth conditions that are wrong on the boat, things that are in need of repair to insure safety.

Given to understand what the purpose of the Ship Safety Committee is, mapping out the course they are to sail, with due cooperation from the office and officers and sustaining them in their recommendations for changes that will further insure safety whenever those changes are feasible, seamen will successfully conduct Ship Safety Committees on all waters.

We have now had practically six seasons of the Ship Safety Committee and progress is still being made. The Welfare Committee is more than satisfied with what has been achieved, and laying aside the humanitarian aspect and looking from the viewpoint of dollars and cents, I believe the vessel owners have been well compensated for their annual outlay in the maintenance of these committees.

CARBON DIOXIDE IN MARINE FIRES

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The trite and time-worn adage to the effect that "necessity is the mother of invention" has perhaps no better example than in the field of fire extinction, where special hazards have resulted in the development of many new methods of dealing with them. In the marine field, more than usual fear has always been attached to the thought of fire, regardless of the actual hazard involved, because of the fact that human beings involved cannot escape their problem by simply leaving the fire, as is so often the case on land.

It is therefore not surprising that the first proposal to use carbon dioxide as a practicable means of fire extinction had reference to marine fires. Lieutenant F. M. Barber, of the United States Navy, was the originator of the scheme, and it was in 1875 that he described the then newly developed means of liquefying carbon dioxide commercially and confining it in steel cylinders, and suggested that bottles of carbon dioxide kept on the deck of a vessel could be emptied into the holds in order to extinguish fires.

However, Barber's suggestion was treated only as a theoretical possibility for a quarter of a century, until the development of carbon dioxide systems for marine fire extinction began in Europe, and especially in the Scandinavian countries. The Lux system, in Sweden, has attained a high state of development, and reductions in insurance premiums are offered by the Swedish underwriters to vessels equipped with this system. The application of liquefied carbon dioxide to the extinction of marine fires in the United States has been relatively recent.

ADVANTAGE OF LIQUEFIED CARBON DIOXIDE

Stated briefly, the advantages which recommend liquefied carbon dioxide fire extinction to the attention of shipowners are as follows:

- (1) The gas permeates inaccessible places and is effective around corners.
- (2) On account of its low-boiling point, it does not condense and lessen its own effectiveness, as is the case with steam.
- (3) It is the only means of extinguishing fires by smothering which at the same time has a definite cooling effect. The temperature of the gas released into the holds is about 100 degrees below Fahrenheit.
- (4) On account of its high specific gravity it seeks the bottom of the cargo spaces, and is admirably adapted to be confined with small loss in the hold of a vessel.
- (5) On account of this ability to hold the carbon dioxide atmosphere in contact with the fire, it makes possible the bringing of vessels into port when the fire in question is not of a character to be altogether extinguished by any available agent.
- (6) The gas is colorless, odorless, tasteless, and non-poisonous. Like water, it will not support combustion, hence life will drown in either one when the oxygen supply is cut off; but it should be emphasized that it is not a poison any more than is water.
- (7) On account of the colorless nature and low temperature of the gas, it is possible for men equipped with oxygen helmets safely to make explorations and even to perform labor in carbon dioxide atmospheres. This cannot be done during the application of live steam in a confined space.
- (8) Carbon dioxide is neutral towards almost all kinds of cargo, and will not damage the finest silks or the most delicate merchandise. It is even used commercially as a preservation for foods, and in preventing the deterioration of oils, flavoring materials, coconut, and other products. This quality of not damaging goods not actually on fire is possessed by no other fire-extinguishing agent.

(9) It can be used on motor ships where steam is not available.

(10) Carbon dioxide systems can be installed at comparatively small expense because it is possible to distribute the gas through steam piping, the installation of which is required by law.

(11) The presence of carbon dioxide even in percentages lower than are required to extinguish fire, greatly reduces hazard of fire and explosion. Spontaneous combustion proceeds more slowly where the oxygen content of the air is reduced and combustion of any kind takes place less violently. The explosive limits of mixtures of combustible gases and vapors with air are narrowed and the velocity of propagation of flame in such mixtures is reduced. All these effects tend to reduce fire and explosion hazard.

(12) The supply of carbon dioxide is independent of boilers and all other mechanical equipment on the vessel and is available at any time on simply opening the valves of the containers.

DISADVANTAGES

The chief influences which have hindered the more rapid introduction of carbon dioxide systems on American shipping are the following:

(1) Steam is usually available, and the familiarity of the crew with steam is an argument in its favor.

(2) Carbon dioxide is regarded with suspicion by many whose limited knowledge of chemistry causes them to class all kinds of "gas" as poison.

(3) The non-technical man wants a fire extinction medium that he can see and feel, and carbon dioxide does not meet these requirements. Faith in agencies which cannot be handled is a little higher in the scale of intelligence.

(4) The amount of gas which can be carried economically is usually much less than the amount required to "gas" the entire cargo space of the vessel. While this may be regarded as a limitation on carbon dioxide systems, there is no excuse for any fire on a carbon dioxide-equipped vessel reaching the proportions of a general conflagration.

(5) For the most effective use of any fire-extinguishing agent, it should be applied under the supervision of some one who understands the fundamentals of the chemistry of combustion. Unfortunately, this is a large order which can seldom be filled. There has been a feeling that carbon dioxide requires more specialized knowledge and experience to apply than other fire-extinguishing agents, but at least as regards marine fires this is not the case.

EXTINGUISHING FIRE AND PREVENTING SPREAD OF FIRE

The distinction between the requirements for preventing the spread of fire and the requirements for actually extinguishing it are not generally understood. Fire may be spread in two ways, namely, by actual communication of heat through solid material and by gaseous combustion. In most materials the spread of fire in the combustion of incandescent solids is so slow that it can be ignored in comparison with the spread

of fire through gaseous combustion or flame. Hence, where sufficient percentages of carbon dioxide or steam are employed to prevent gaseous combustion, all flame will be extinguished. In the case of flash fires, or of fires in liquid hydrocarbons or of gases, this is tantamount to extinguishing the fire altogether. With most types of cargo, however, flame is the result of the combustion of such materials as wool, coal, fibers, etc., which leave behind incandescent residues. Extinguishing flame is not equivalent to extinguishing incandescent material, and the incandescent material will continue to glow and absorb oxygen from the atmosphere until it is cooled below its ignition point or until the residual oxygen in the atmosphere reaches a very low figure.

The successive steps in extinguishing a fire by means of either steam or carbon dioxide are therefore as follows:

(1) To build up a concentration of the smothering fluid such as to reduce the oxygen of the air to below 17 per cent, where all flame will be extinguished, with certain exceptions not commonly encountered in marine fires.

(2) To maintain this concentration until the burning incandescent material, if any, is below its ignition point.

The first function is rather easily performed by either steam or carbon dioxide. However, there will always be marine fires which cannot be absolutely extinguished by any fire extinction system short of sinking the ship, and perhaps the ability to check quickly the spread of fire is as important as the ability actually to extinguish it. Be that as it may, there is an important difference between steam and carbon dioxide in this connection. Where fire is not actually extinguished, but only checked, by the smothering medium, a vessel using the carbon dioxide system could be brought into port with little or no additional gas application after fire is once checked, while it would be necessary continually to apply additional steam to compensate for condensation.

As regards cooling the incandescent material below its ignition point, it is impossible to generalize, because both the character of the combustible and the particular conditions surrounding each fire determine the normal rate of cooling of such material after combustion has been stopped. In the case of cotton, fires which are once started, are propagated in part by an exothermic reaction in the fiber, and it is very difficult to stop this reaction after it has been started. It is perhaps safe to say that the most to be expected from any fire extinction system with cotton cargoes is the checking of fire by preventing actual flame, and thus permitting the segregation of the burning material on arrival at port. It is almost unnecessary to state that the absence of damage to material not actually burned should be a consideration.

In other cases there is no incandescent material to consider, and, when flame is extinguished, fire has been conquered. In still other cases, the incandescent material may be more or less difficult to cool. In any event, it may be said that no smothering agent can compare with large volumes of water for cooling and quenching effect.

However, certain comparisons may be made between steam and carbon dioxide in this respect. Steam is introduced into holds at temperatures over 212°F., while carbon dioxide is introduced at 100° below zero Fahrenheit. The indication is obvious. Moreover, the latent heat of steam operates to heat rapidly the contents of the hold to 212°F., while a part of the carbon dioxide is introduced in the form of carbon dioxide snow. The latent heat of vaporization of this solid carbon dioxide operates in the opposite manner to assist in cooling the cargo.

THE DANGER OF CERTAIN HEATS

Heating certain combustible materials to 212°F. by steaming is not a very serious matter, but, with other materials, is distinctly not to be desired. In the case of volatile flammable liquids stowed in drums, steaming is an excellent aid to vaporization. In the case of substances liable to spontaneous combustion, warming to this temperature gives great impetus to the accumulation of heat for fresh outbreaks of fire. For example, 150°F. has been regarded as a dangerous temperature for coal in storage, and temperatures in excess of this have been regarded as an indicating danger of fire from spontaneous combustion, yet coal storage fires have been deliberately treated with steam at temperatures above 212°F. Lewes years ago pointed out that liquefied carbon dioxide is the only smothering agent which also cools the coal below the danger point.

The list of hazardous commodities issued by the Marine Committee of the National Fire Protection Association includes about 300 different commodities, and about 130 of these are of such a character that they should not be steamed. This means that they are volatile flammable liquids which are more hazardous when warm than when cold, and solids which must be kept dry to avoid danger of spontaneous combustion or actual fire or explosion, as in the case of calcium carbide, potassium metal, and sodium metal. Compressed and liquefied gases which should be kept cool are also included.

The behavior of every fire is dependent upon the relation existing between two heat quantities. Where the amount of heat generated by combustion is in excess of the heat which can be dissipated, the fire increases in size. Where the amount of heat generated is exactly equal to the amount dissipated, there can be no temperature change, and it is said that the fire smolders. Where the amount of heat generated is less than that dissipated, the combustible cools, and the fire dies down or goes out.

This statement is equivalent to saying that there are all possible degrees of success in extinguishing a fire. Fires which are beyond control before any fire extinction means is applied need not be discussed. However, the principal object of marine fire apparatus is to get the vessel into port, with the fire extinguished, if possible, under control if not extinguished, but at any rate to get the vessel into port. Any treatment which accomplishes this result may be considered successful in a degree.

Smothering media decrease the heat generated by the fire in proportion as the decrease the oxygen present. When the heat generated is reduced until it becomes smaller than the quantity of heat dissipated, then the burning material necessarily cools. As has already been pointed out, it is easier to maintain an atmosphere of a given low oxygen content while this cooling takes place with carbon dioxide than it is with steam. It has also been indicated that the cooling effect of the carbon dioxide, pound for pound, is much greater than the cooling effect of the steam, and cools to a much lower temperature.

EXPLORATION OF CARGO SPACES

The carbon dioxide system makes possible a great advance in the treatment of marine fires which has not been practiced heretofore to the writer's knowledge.

In coal mine work men often are sent into sealed-off areas containing irrespirable gases. These men are equipped with oxygen helmets, and may explore and report on the conditions they find, or may even perform labor. In a recent large mine fire between 50 and 60 men wearing oxygen helmets were constantly employed for over six months. These men loaded 5,500 60-cubic-foot cars of coal and debris during this time.

Why could not some marine fires be treated in similar fashion? Cargo spaces properly sealed and treated with carbon dioxide can be left alone, or, if necessary, small additional amounts of gas can be added to compensate for leakage, until the vessel reaches port. Conditions can then be investigated as far as possible by men wearing oxygen helmets, without ventilating the hold and thus without taking any risk of rekindling dormant fire.

In many cases, of course, the cargo is so placed that this kind of exploration would not be practical, but, where conditions warrant, part of the cargo could be unloaded by helmet men without ventilating the hold any more than absolutely necessary. In this way much valuable material might be salvaged, undamaged by water or steam.

It need hardly be pointed out that men could not enter holds in this manner while the holds were under treatment with steam.

Water Damage—Enough has been said to indicate that considerable saving would be effected by the substitution of carbon dioxide for steam if water damage alone were eliminated. Many materials not easily combustible in themselves suffer great damage from being wet. Wool is perhaps a good example. Wool, as such, is not considered highly combustible, but fire in a wool cargo, followed by treatment with water or steam, means as a rule that the cargo becomes valueless.

Development of Carbon Dioxide System—The carbon dioxide system now on the market in the United States has reached a satisfactory state of development, and many of the defects which qualify the success of every new mechanical appliance have been eliminated. It is safe to state that this apparatus is as dependable as any fire-fighting equipment that can be obtained.

In conclusion, the writer wishes to make clear his position with regard to the use of steam. Steam is generally recognized as a satisfactory means of fighting fires in the cargo spaces of a vessel in the present stage of development of extinguishing apparatus and its use is not to be discouraged. It hence appeared to the writer that no better way of setting forth the merits of carbon dioxide could be found than to compare it with steam.

It is indeed unfortunate that practically all of the great annual loss by marine fires takes place under conditions which do not permit the careful scientific study of individual fires, and the exact determination of gas compositions in the holds, etc. Had it been possible to accumulate much data of this kind, "the present stage of development of extinguishing apparatus" would undoubtedly be further advanced.

The writer admits his prejudice, but believes that the day will come, sooner or later, when carbon dioxide, which is now applied principally to vessels lacking an adequate steam supply, will be universally applied on both steam and motor vessels carrying cargo the value of which is a consideration.

Chairman Welch: In addition to those present yesterday, those here today are:

Mr. M. D. McIntyre, representing Mather & Company, steamship operators.

Mr. Frank A. Epps, Manager, Fire Prevention Department, Tidewater Oil Co., New York City.

Mr. W. G. Duncan, Pennsylvania State College, School of Mines.

Mr. Titsworth: Here is one case of actual use of carbon dioxide by the American Hawaiian Company. This was some years ago, before the development of the permanent apparatus. The ship was afire when she arrived in port. They brought the ordinary commercial cylinders of gas and injected the gas in liquid form into the holds and smothered the fire and proceeded to unload the cargo until the oxygen which was admitted permitted the fire to blaze up again; then they put on the hatches and put in more gas, and by repeating that they succeeded in unloading the entire cargo without damaging the ship.

Another instance is the San Francisco a year ago, which entered the port of New York with a fire in the bunkers, which had burned through the bulkhead to a cargo of hides. There the gas was used, but the faith of the ship captain and fire department wasn't sufficient to rely on the gas, and they insisted upon using steam with it, and consequently it didn't have its full effect. But, anyway, the gas succeeded unquestionably in extinguishing the fire between decks, although the fire wasn't entirely extinguished in other portions of the ship and it had to be flooded.

But the work has gone far enough for me to feel confident that it is practical.

THURSDAY MORNING SESSION

Chairman Welch: The first speaker will be our worthy Vice-Chairman, Captain Irving L. Evans, vice-president, United States P. & I. Agency, agents for U. S. Shipping Board, New York City.

SHIP PERSONNEL HAZARDS

CAPT. IRVING L. EVANS, VICE-PRESIDENT, UNITED STATES P & I AGENCY,
AGENTS FOR UNITED STATES SHIPPING BOARD, NEW YORK CITY

Without seamen and without the wonderful record of achievement, the heroic heritage with which they have endowed the world, men today would live in hopeless isolation.

In the old days, the mariners were skilled in the art of handling great ships under sail, making them respond to their will and wishes, aided only by the wind. Today, with every device of recent invention that may be lavished upon a ship, human control and direction is still essential. The duties and responsibilities of the men have increased in proportion to the size of the ships, their engines and their numerous complicated machinery and equipment.

The seaman's relation to the shipowner is one of contract. The contracts of seamen have always been considered among the most important in Admiralty, for the reason that a good crew is essential to a successful voyage.

For this reason, the utmost encouragement and the fullest protection have always been accorded to seamen, and such is now the established policy of the Admiralty Law.

Justice Story, in a very interesting opinion, written in 1832, about the rights of seamen to maintenance and cure, said:

"They are a class of persons remarkable for their rashness, thoughtlessness and improvidence. They are generally necessitous, ignorant of the nature and extent of their own rights and privileges, and for the most part incapable of duly appreciating their values. They combine in a singular manner, the apparent anomalies of gallantry, extravagance, profusion in expenditure, indifference to the future, credulity which is easily won, and confidence which is readily surprised. Hence it is, that bargains between them and shipowners, the latter being persons of great intelligence and shrewdness in business, are deemed open to much observance and scrutiny; for they involve great inequality of knowledge, of forecast, of power and of condition. Courts of Admiralty, on this account, are accustomed to consider seamen as peculiarly entitled to their protection; so that they have been, by a somewhat bold figure, often said to be favorites of Courts of Admiralty. In a just sense, they are so, so far as the maintenance of their rights, and the protection of their interests against the effects of the superior skill and shrewdness of masters and owners of ships are concerned." (Brown vs. Lull, 2 Sumner 449.)

There were no legal requirements as to hours of labor at sea before 1915, although long established custom had divided the deck crew into two watches and the engine room crew into three watches. There were, of course, certain variations and modifications in this plan in special trades and at certain times for special reasons. The established custom has now been enacted into law.

REQUIREMENTS OF LAW

It has been carefully worked out and is now fixed by law just how much and what kind of space shall be provided for the crew's quarters. Proper washing and bathing facilities are also required.

Since 1790 the Statutes of the United States have specified a scale of provisions to be carried upon ships. Seamen have an option, under law, of accepting the provisions offered or of demanding the legal scale.

American merchant vessels which ordinarily make voyages of more than ten days' duration and carry a crew of twelve or more seamen are required to have, in addition to the regular crew space, a separate compartment for hospital purposes, with at least one bunk for every twelve seamen, provided, however, that not more than six bunks may be required.

All American ships engaged in the foreign trade or in the trade from the Atlantic to the Pacific, or vice versa, if of more than seventy-five tons, are required to have on board a properly supplied and equipped medicine chest. Practically all ships now carry such equipment, and many carry much more than is required.

Since the early part of 1922, applicants for a deck officer's license have been required to pass an examination, in addition to the usual requirements, showing that they are qualified to render first aid at sea.

It is the duty of the United States Local Inspectors of steam vessels to inspect ships once each year. Ships cannot continue to sail without passing such annual inspection. Among other things, the inspectors require that exposed machinery or places of danger which they observe and which can be guarded, have the protection placed and reported to them, with the other things required, before the ship gets her new inspection certificate.

Seamen becoming ill or being injured while in the service of a ship, except by reason of their own vices or willful misconduct, are entitled to maintenance and care or cure at the expense of the ship, irrespective of the negligence of any other member of the ship's crew, and irrespective of whether the seaman was guilty of contributory negligence.

The United States Circuit Court of Appeals, for the Second Circuit, in the case of *The Bonker No. 2*, said:

"By the custom of the sea the hiring of sailors has for centuries included food and lodging at the expense of the ship. This is their maintenance, and the origin of the word indicates the kind and to a certain extent the quantum of assistance due the sailor from his ship. We agree with the remark in The Mars, supra, that:

"The word 'cure' is used in its original meaning of care, and means proper care of the injured seaman, and not a positive cure, which may be impossible."

COMPENSATION NOT NEW TO MARITIME INDUSTRY

It must therefore be apparent that the employment of seamen, their rights, duties and obligations, places them in a class which is comparable to no other class of employees in the world.

For centuries, the maritime industry has had and carried the responsibility and expense for injuries received and illness incurred by its employees in the line of their duty.

The steps taken during recent years by most of the states toward the passage of compensation laws, placing upon each industry the duty of providing compensation for those injured and the dependents of those killed in that industry, is only applying some of the general principles which have been followed for centuries in the maritime industry.

Repeated efforts have been made in very recent years to change, by legislation, the long established rule which prevented seamen from recovering damages on account of injuries sustained in line of duty. The Supreme Court has held, in substance, several times that the Constitution of the United States seeks to preserve the uniformity of the principles of the Maritime Law, and that to the extent that such laws are in conflict therewith they are unconstitutional.

The trend of recent legislation referring to seamen has been generally favorable to their interests.

The whole tendency during recent years has been toward the advancement of safety at sea. Many of these improvements have been required by law, while others have been voluntarily by the owners of vessels, because there has been a somewhat broader interest taken by the ship-owners in the welfare of the men who go to sea.

Unfortunately, there is no department, bureau or other agency which keeps a record of all marine accidents—that is, personal injuries and deaths. The United States Steamboat Inspection Service does keep a record of the number of deaths occurring on and in connection with American vessels. They show, for example, that for the fiscal year ending June 30th, 1922, which are the latest figures available, the total number of lives lost from all causes was 266, a decrease of 64 from the previous year. These were divided—95 passengers and 171 crew. Of the lives lost, 178 were due to suicides, accidental drownings and other causes said to be beyond the power of the Steamboat Inspection Service to prevent. The remaining 88 deaths are officially reported to have been due to collisions, foundering, accidents, etc.

During the same period, 235,802,603 passengers were transported on vessels required to report the number of passengers carried. The figures show that the life of only one passenger was lost of every 2,482,132 carried. It is therefore apparent that ships furnish a pretty safe means of travel. The small number of accidental deaths among the crews, which

might have been prevented, shows, when compared with the average number of men employed, that ships are also as safe places to work as will be found in any other industry. This does not mean that all has been done that can or should be done.

CLASSIFICATION OF SHIPS

Coming now to the consideration of the more direct problem of "Ship Personnel Hazards," we must first consider very generally the class of vessels or the trades in which they are engaged. We may refer to these as being of three general classes—first, those in the ocean, coastwise and intercoastal trades; second, those upon the Great Lakes, and third, those on all other lakes, bays, sounds and rivers.

It is assumed that it is only the first two classes of vessels in which the Marine Section of the National Safety Council is interested at this time, because the third class is too widely separated and is operated under too widely varying conditions to be easily reached or dealt with.

Practically all the vessels engaged in the ocean, coastwise and intercoastal trades are represented by membership in one of the following associations: The American Steamship Owners' Association; The United States Ship Operators' Association; The Pacific American Steamship Association, and The Ship Owners' Association of the Pacific Coast.

The United States, as the owner of a substantial part of the American tonnage, is not a member of any of the associations named. However, the United States Steamship Operators' Association is composed largely, if not wholly, of Managing Agents for Government ships.

About 80 per cent of the tonnage upon the Great Lakes is represented by the Lake Carriers' Association, and a substantial portion of the remaining 20 per cent is represented by the Lumber Carriers' Association. We will refer to the vessels on the Great Lakes and the employees thereon only incidentally, and for the purpose of illustration because their problems and progress in safety work have been explained by another speaker.

In this connection, we wish to refer just for a moment to the results obtained on the American vessels upon the Great Lakes. The efforts of the Lake Carriers' Association, its members and the men on their ships, have made marked and commendable progress in the prevention of accidents on board ship. This progress has been caused by two prime considerations—first, the awakening of an intelligent interest in the shipowners and in the men themselves for the safety and welfare of those employed on the ships; second, some of the leading steamship companies on the Great Lakes carry no insurance against claims for personal injuries and deaths occurring on their ships, but take care of such accidents and claims out of special reserve or insurance funds set up in their own accounts for that purpose.

It is, therefore, to the direct financial interest of the shipowners to keep accidents at a minimum. Several of the large steamship companies on the Great Lakes save many thousands of dollars each year by following careful and systematic plans for accident prevention, then paying their losses instead of paying insurance premiums.

This policy of accident prevention also works to the advantage of the shipowners on the Great Lakes who do carry insurance, because they, too, are working to the same common end, with the result that their insurance premiums for protection against this class of claims have been reduced in proportion to the success of their efforts.

On the other hand, those engaged in the operation of ships in the ocean and coastwise trade, with certain comparatively unimportant exceptions, carry insurance in either the American or other P. and I. clubs or companies protecting themselves and their ships against personnel hazards. There are individual shipowners and agents engaged in the ocean and coastwise trades who are just as deeply interested as the shipowners on the Great Lakes, and for precisely the same reasons, but there is no organized plan, either in existence or in prospect, for uniform and combined efforts toward accident prevention on their ships.

MOST FREQUENT CAUSES OF ACCIDENTS

Speaking generally and briefly at first, it may be said that the following are among the most prominent and frequent proximate causes of injury on board ship:

- (1) The lack of proper leadership.
- (2) The lack of prudence on the part of the men themselves.
- (3) The use of intoxicating liquors, and narcotics.
- (4) The failure of those on board to keep the ship's equipment and appliances in order, and to properly use the same.
- (5) The large turnover in the personnel on each ship after each voyage.

As already indicated, the foregoing are broad grounds to which a very large percentage of all accidents on board ship may be traced in one way or another. Further reference will now be made to these several subdivisions, in order that a clearer understanding may be had thereof.

THE LACK OF PROPER LEADERSHIP

The art of leading or commanding men is absolutely essential to the successful handling of a ship. A good crew is vitally important to a successful voyage. There is no other industry in which leadership of the highest type is so essential. This is demonstrated daily. One ship will come in from a long and successful voyage with everybody well satisfied, and no reports of crew trouble, accidents or injuries of importance. On the other hand, another ship of the same type, in the same trade, will return from a similar voyage, having had crew trouble throughout her absence, with everybody ready and anxious to leave when the voyage is ended. There will be numerous reports of major and minor accidents, with possibly one or two or even more men left in hospitals in foreign ports on account of injuries.

It is the man who lacks knowledge, experience, foresight, judgment and the other necessary qualifications for leadership who will leave hatchways open and without having lights or guards placed about them,

or other measures taken to prevent accidents, while cargo is not being loaded or discharged. It is the same type of man who orders a ladder put over the side for the crew to use in going ashore and returning to the ship, without seeing that it is secured to prevent its slipping or falling; he also fails to have a light placed at or near the point where the ladder is, or to see that the lashing holding the ladder is not broken when the tide falls and the ship goes down somewhat.

The larger and faster ships have in no way lessened the demand upon the ancient art of seamanship. The seamanship of today, while of a different character, is no less important because new and different gear is required; because steel and fibre ropes of unprecedented size are now required, and because tackle of all kinds is heavier and stronger. An understanding of the art of seamanship in its broad sense is of great importance to all who contribute toward the construction, equipment, management and navigation of a vessel. A ship is safe only so long as she is seaworthy and ably handled. While she may sail smoothly and quietly in fair weather, the sea is no respecter of ships or persons. It is always ready, at the first sign of failure or weakness, to rush in and destroy both life and property. One small mistake or error in judgment, a few seconds hesitation in giving the proper order, may make a comfortable and safe ship a horrible death trap. A great passenger liner, with hundreds, perhaps thousands of human beings on board, and millions of dollars worth of property, rushing through the sea at high speed and with tremendous momentum, may become a palace of death when she cuts down another vessel, rams an iceberg or a derelict, or runs upon a reef or rock. At such times and in such circumstances, it is only those who are really worthy of the name "seaman," those fundamentally worthy of the sea, who will meet the real tests. The weak, the hesitant and the incompetent may succeed on shore, but the sea will sooner or later uncover these shortcomings and disaster often and usually follows in its wake.

The basic qualities for leadership at sea grew out of constant contact and experience with danger, and place the art of seamanship upon the very highest plane of responsible human employment. *It is these exacting requirements, having their origin in the law of the sea, which cause the strong feeling among seafaring men, almost akin to religion—that disaster is disgrace.* This inward feeling of the real seafarer often expresses itself by the master going down with his ship. He feels that his seamanship has failed; that he has failed in an emergency; that he has lost his shield of honor, and he therefore pays the price of failure with his life.

INDIFFERENCE OF MEN TOWARD THEIR OWN SAFETY AND THE SAFETY OF
EACH OTHER

Seamen are generally daring and reckless. Many of them lack the power to measure the danger which confronts them. They lack that alertness and watchfulness which is so important to a man in a class of work which is so often surrounded by dangers. An example of this is furnished by the case of a man using an oil can, instead of a brush that

was available, to lubricate gears which were guarded. The spout of the can got caught in the gears and the man put his hand behind the guard in an effort to recover it. This effort resulted in the complete loss of all the fingers on his hand.

Most places visited by American ships engaged in the foreign trade still sell liquor of some kind and quality. The result is that many of the seamen return to their ships at times feeling pretty well satisfied with the life of a sailor. They usually have not imbibed to the point where they have to be helped, for then they are usually looked after by the shipmates. It is the fellow who is just happy, indifferent, reckless and thoughtless who comes on board and either falls off the ladder, into a hatchway, or down a companionway or elsewhere without even seeing or knowing the danger until he is in a hospital.

Eleven out of twelve masters and chief engineers whom I have asked the question recently as to the most frequent single cause of accidents to seamen, have replied with the single word, or its equivalent—"Drinking." Accidents which may be traced, either directly or indirectly, to the use of narcotics are, unfortunately, increasing.

FAILURE TO KEEP THE SHIP'S EQUIPMENT AND APPLIANCES IN ORDER, AND TO PROPERLY USE THE SAME

The failure of those on the vessels to use properly the equipment and appliances furnished and to keep the same in a safe condition, not withstanding the fact that the shipowner has furnished the material with which this may be done, is a frequent cause of accidents. The officers and men alike will frequently use an old, worn out fall, pennant or other equipment until it breaks and possibly injures someone, instead of replacing it from stocks on the ship. Every well managed Company has on board its ships a supply of new rope, blocks, tackle and gear of all kinds, together with many spare parts to replace any equipment or appliances that may be worn out or broken during the course of the voyage. There is, therefore, usually no excuse for the failure of those on the ship to replace old and wornout gear.

The improper care of equipment often results in accidents because the men attempt to do something without getting the proper equipment or gear for that particular job, or by using the equipment at hand for the particular job in a careless, negligent or indifferent manner,—in other words, in a way in which it is not made or intended to be used. An example of the improper use of the appliances furnished is the case of a man who was operating a cargo winch. The running part of the fall got jammed between the turns around the drum. Instead of the operator clearing the fall, which he saw and knew about, he proceeded to go ahead according to signals. The result was that the fall wound in the reverse direction on the drum of the winch. While lifting into place one of the strongbacks for the hatches, the weight pulled the fall out of the jam on the drum, causing the draft to drop suddenly and thus throw another member of the crew into the hold, causing his death.

LARGE TURNOVER IN PERSONNEL AFTER EACH VOYAGE

The reason that many accidents are caused by the change in personnel at the end of each voyage must be perfectly apparent. It is, of course, due to the fact that the men come aboard the ship, unacquainted with its construction and general lay-out, frequently only a short time before the vessel is ready to sail. While they are performing their regular duties and at the same time getting acquainted with the ship, they frequently get into difficulties, resulting in more or less serious injuries.

It may be of interest to refer more specifically and concretely to the causes of injury than we have thus far, but it is impossible to cover the entire field of causes of accidents. They range all the way from men falling from the smokestack or masts to their falling upon the deck while passing along where a little spray has blown up over the side and fallen upon the deck.

In order to give a fairly concrete picture of the situation, we have selected, at random, 100 cases handled by our agency—that is, which have been settled. They show the following results:

(1) Falls (including slippings on deck from water, ice, oil, etc.)	48
(2) Heavy weather—men struck by seas, etc.	5
(3) Handling heavy weights	9
(4) Working around machinery	6
(5) Burns and scalds	5
(6) Handling lines and running gear (rigging)	8
(7) Handling dunnage	5
(8) Fumigating gas	2
(9) Miscellaneous	12
Total	100

The marine industry is seriously handicapped in that there is no source of information, reliable or otherwise, showing even the approximate number of major personal injuries, to say nothing of those of a minor nature, occurring on board ships. The first and one of the most important steps in accident prevention is to know the number and principal causes of accidents, in order that those engaged in the work may get at the root of the difficulties and correct them. It is therefore of interest to the shipowners, either through their respective associations or otherwise, to collect, compile, classify and distribute such information.

It is apparent from what has already been said that there must be some sound business reason advanced, in addition to the human interest, before the shipowner is going to think seriously about or take a great interest in accident prevention on board ship. We are not advocating the self-insuring idea to the ocean and coastwise shipowners or anyone else, because it is only strong and very well managed Companies which can afford to undertake such an enterprise. We do believe, however, that it will be proportionately as profitable to have a crew which is 100 per cent sound as to have ships using oil instead of coal as fuel, or Diesel or

turbine engines rather than the reciprocating type. The shipowner adopts those things, not because they are new, but because they offer prospects of profit or gain which the old method or system did not offer. A healthy, sound crew, protected against injuries and illness just as far as possible, will make the operation of the modern ship, with her modern machinery and equipment, proportionately profitable.

Efforts at accident prevention by a few American shipowners acting alone, while they are in the same general class with all other shipowners, both American and foreign, will avail nothing more than the very great personal satisfaction to the individual companies of knowing that they have had less than the average number of injuries or deaths in their lines. If, however, all or a substantial part of the American shipowners work together, through their respective associations or otherwise, upon a campaign of education for accident prevention on board ship first, among their shore staffs; second, among their ship's officers, and third, among the unlicensed personnel, they can and will soon be able to demand and receive a reduction in their P. & I. insurance premiums. This, however, is the smallest part of the prospective benefit, because the ships frequently pay and feed men for days and even weeks, and receive neither work from them nor reimbursement for the expense from the underwriters. In addition, the general morale and the consequent good results from the crew will add to the efficiency of the ship and the success of the voyage.

What is needed now to reduce the number of accidents on board ships is not more and better laws, but greater interest on the part of shipowners, officers and men themselves, in accident prevention. The creation of an interest in accident prevention will cause those who think upon the subject and who are working to that end, to develop prudence,—the power to measure danger; they will acquire a certain alertness, watchfulness and aptitude for observing and correcting defects or dangers which may result in accidents.

Connected with the development of these qualities, and as a direct, natural and logical outgrowth of them, there will be more efficient and profitable operation of the ships. The result will be beneficial to both the seaman and the shipowner.

THE WORK OF THE U. S. COAST GUARD IN RESCUING LIVES IN PERIL AT SEA

COMMANDER F. C. BILLIARD, UNITED STATES COAST GUARD,
WASHINGTON, D. C.

The Federal Government is contributing toward the safety and preservation of human life in various ways; mostly by insisting upon certain requirements, by making certain inspections, by testing apparatus and by suggesting various processes.

There is, however, one branch of the Federal Government—and as far as I am aware, only one—charged with the actual physical rescue of persons in peril at sea. That is the U. S. Coast Guard.

In the fiscal year just ended July 1, 1923, the number of lives saved or persons rescued from peril by the Coast Guard was 2,792. That that number is not unusual is attested by the fact that in the preceding fiscal year the number of lives saved or persons rescued in peril was 2,954. In the last fiscal year the number of persons on board vessels assisted by the Coast Guard was 16,253. The number of persons in distress actually cared for was 648. The instances of lives saved and vessels assisted was 2,236. And during the preceding fiscal year, for I have not the figures for the one just concluded, the total value of vessels assisted, including cargoes, was \$35,346,765.00.

HISTORY OF COAST GUARD

The Coast Guard operates in time of peace under the Secretary of the Treasury and in time of war or when the President does so direct, as a part of the Navy of the United States. And in time of peace the Coast Guard is charged with a variety of important duties, nearly all of which are essentially humanitarian in their character.

ASSISTING VESSELS IN DISTRESS

In the front rank of the peace-time duties of the Coast Guard is the assistance of vessels in distress. Ships get into trouble at sea either by being stranded on the beach or as a result of fire, collision or foundering. The greatest danger to our shipping, at least on our ocean coasts is in the winter time. You may not know that there is an old statute authorizing the President to detail any public vessels he desires to cruise on the coasts in the winter months to render all possible assistance to mariners as their circumstances may require. The Act says "public vessels of the United States." But for many years that work has been done by the Coast Guard cutters and each year the President designates all of the sea-going cruisers on the Atlantic coast to perform that duty.

We have operating on our coasts some twenty-eight first-class sea-going cutters. Immediately upon receipt of information—usually by radio—that a vessel is in distress, ashore or within the scope of our operations, a Coast Guard vessel proceeds immediately to her assistance. You will, of course, know it is in the same bad weather, the same gale that has brought disaster to the vessel at sea, that the cutter must proceed to her assistance. More impressive to the seaman's mind is the fact that when the merchant vessel is stranded on a rocky shore or on a sand shoal, it is into those dangerous waters that the cutter must proceed to render her assistance.

When the cutter comes up with the vessel at sea, unless it be necessary immediately to remove her passengers and crew, it is almost always essential to put a hawser on board her and tow the disabled vessel into port.

In the case of stranding of a vessel, the cutter will endeavor to work her way in, put a line on board and haul the vessel off if opportunity

offers. At the same time, one or more of the cordon of Coast Guard stations around our coast—270 in number—will take immediate steps, if necessary, to bring ashore the passengers and crew from the strand.

In the case of stranding on our ocean coasts the beach patrol immediately will call the station crew and they, if conditions favor, may launch the surf boat to bring off the people in peril or make use of what is called the breeches-buoy. In the latter case, a small line is shot across the wreck. The people on board of the wreck have usually taken refuge in the rigging and will haul in this whip line and haul aboard a hawser carrying another whip line attached to which is a piece of board containing instructions in French and in English as to just what to do. With this whip line the breeches-buoy is hauled back and forth between the ship and the shore and the people landed. And, of course, there have been literally hundreds of instances of passengers and crew hauled ashore by the use of this breeches-buoy.

METHOD OF RESUSCITATION

The Coast Guard has become efficient also in the art of resuscitating the apparently drowned. We practice what is known as the manual method and you may be interested to know that the personnel of the Coast Guard are forbidden to use pulmotors or any artificial appliance. Our men work on the supposedly drowned person solely by the manual method of moving the arms, rubbing the limbs, and the like. And some very remarkable results have been obtained of people restored to life who have been known to be under water for twenty or twenty-five, and, as I recall it in some cases, thirty minutes.

In line with the protection of human life is the work of the Coast Guard in locating and removing derelicts at sea. A floating derelict, a water-logged wreck of a schooner, we will say, in the paths of commerce is about as great a danger as our ships are liable to encounter. It is the duty of the Coast Guard to locate these derelicts and then destroy them. That involves as you may readily understand often days and days of arduous and disappointing search.

The various maritime powers of the world have united in a convention to maintain during the dangerous season, a constant patrol on the Grand Banks of Newfoundland to locate fields of ice and to warn passing steamers in the trans-Atlantic lanes of the presence of those bergs. That work is performed exclusively by the Coast Guard and I may say that the work is being appreciated apparently more and more not only by our own people in our merchant marine but by foreign governments.

It was my privilege to be present in Washington a few days ago at the Annual meeting of this Ice Patrol Inter-Departmental Board and it was most impressive to hear from disinterested persons how efficient that patrol has become. I think I may say that every passenger on board a liner crossing those dangerous zones in the Spring of the year owes in part his safety to the faithful and extremely arduous patrol maintained by the Coast Guard.

The Coast Guard assists life in many ways in Alaskan waters, visiting Point Barrow in the Arctic every year and visiting many isolated places in the Aleutian Peninsula. It also aids fishermen. It does most important work in time of peace and I have only touched on some of the duties directly concerned with the conservation of human life.

NEED FOR AIRCRAFT

The Coast Guard of course needs more ships. Many of its ships are wearing out. It needs more men. I have tried to point out to you that this is in fact a "peace and war" service and I think I may say—although it may seem inconsistent in the light of all that I have told you—that it is more or less of a "silent" service. Its work is not as well known or as highly appreciated through the country I think as it should be. The result of all of that is that we do not have the resources, we do not have the funds to do this important work as fully as we should be able to do it. We need aviation in the Coast Guard. You have probably noted that each of these duties I have described to you involves searching and locating an object at sea. Obviously, there is no better way to do that than by an airplane and an equipment of airplanes would be of the greatest possible benefit to us.

We have a very respectable proportion of trained air pilots among our commissioned personnel. Some eight years ago Congress authorized the establishment and maintenance of ten Coast Guard aviation stations along our coasts but it has never appropriated one cent to this day to equip and maintain those stations. And so I should like to feel that you gentlemen with your influence in the affairs of this country will say a good word for the Coast Guard in an effort that we may increase our resources and increase our work. The century old motto of the Service is "Semper paratus"—always ready. We try to be ready as far as human zeal can effect it to perform this work. We do want to be ready to the fullest extent to rescue imperilled humanity and to do that we need more ships, more men, more equipment.

DISCUSSION

Mr. Marr assumes the Chair pro tem.

Mr. Frederick S. Titsworth: I would like to ask if the Lake Carriers' Association, through their splendid co-operation with one another, do anything in the way of rescuing ships on the lakes in distress in co-operation with the Guard?

Chairman Marr: I was reserving that statement for the discussion of the Commander's paper, that the Lake Carriers' Association has co-operated very extensively indeed with the Coast Guard Service. They hold the Coast Guard Service in the highest regard and we have been very active in furthering the interests of the Coast Guard both with respect to their internal questions of organization and supervision under the government and with regard to the salaries paid, which never have been commensurate with the service they perform or the class of men they require for this very highly skilled work.

Mr. Welch reassumes the Chair.

Mr. J. H. Thompson (Travelers' Insurance Co.): I didn't know that you had safety committees on ship board. That is mighty interesting to me because we believe as a company that the committee work which we have tried to do and we have tried to do it largely on shore and in industrial plants, is the most important thing that there is. We have studied statistics a good deal so as to find ways and means of approaching the proposition and we find that physical guarding is only a little bit of the subject. We have many concerns where physical guards—I mean guards over cutting apparatus and gears and pulleys and ropes and all that sort of thing—would only prevent ten per cent of the accidents. It varies anywhere from ten per cent down to forty per cent and all the other accidents, the other ninety per cent, or from forty to ninety per cent, and the average is around sixty per cent, perhaps sixty-five per cent, you cannot touch with physical guards. You have got to work it through this organization, through the committee work.

It means in a ship or in a plant on shore if you are successful in starting committee work and you make that committee a real live one, a committee that really is in earnest, has the owners in back of it wholeheartedly so that they will leave no misunderstanding on the part of the employees that they mean business, you not only accomplish your committee work but along with that you get all of your physical guards taken care of and you get the best possible results.

TRADE AFFECTS RATE

Mr. Kerrigan: The trade is one of the main factors taken into consideration when a rate is being quoted to an owner, the trade in which he is in and his route. His experience is also taken into consideration, but to how great an extent I am not sure.

Mr. Smith: Have any comparison with the lake conditions ever been attempted by the P. & I. Association, the navigation conditions and the liability of cargo damage in cases of that kind? Are the conditions in New York, Philadelphia, Boston and Norfolk considered worse than the conditions in the lake harbors or has it ever been considered one way or the other?

Mr. Kerrigan: I do not know whether it has or not. I don't think so except that every trade has a separate rate and I dare say the lake rate is much lower than the ocean.

Mr. Smith: The stress of weather on the ocean is greater than it is on the lakes and your personal liability and shipping cargo damage is greater.

Chairman Evans: The two different classes of commerce are hardly comparable for this reason: On the Great Lakes most of the cargoes carried are bulk. In the ocean trade, while there are a great many where the cargoes are mixed; in fact, a large majority of the tonnage is of mixed cargoes instead of being straight coal up the lakes or straight grain down as the principal part of it is.

Chairman Evans: The courts have held repeatedly that where the facilities of a hospital are available to a man and where he has been

put in and given treatment and cured as nearly as it is possible he has received all that is due him from the ship. The courts have held also that where a man is put in a hospital where he is being taken care of, maintenance and cure being furnished, and leaves of his own accord before he is cured, he has no further claim because he has by his own act given up and abandoned what was due him.

The number of accidents of a major character which occur on ships are no higher than in the average factory or plant or organization of any kind or on shore. The percentage of deaths occurring at sea are due to marine disasters, to ships catching fire and burning at sea, or foundering or stranding and going to pieces before they can be rescued and that jumps the number up to large percentages in a single disaster, a single day. Take those away from the average run of accidents and you will find that they are brought down to a very small percentage.

You will find some of the companies today who are taking some interest in this kind of work—they haven't gone near as far as they should, but they have so much less in the way of reports that it is noticeable, that it stands out. You cannot help but remark about it.

At the beginning of this year there were engaged to man the American ships engaged in the foreign trade about 25,000 unlicensed seamen and about 5,000 licensed officers. The ratio on the ordinary cargo ship is about one officer to five men. When you get into the big passenger shipping you lose that ratio. You increase substantially the number of unlicensed personnel as compared with the officers. But in the coastwise trade at the present time, I am talking about tonnage and operation, you have about substantially the same number of men and officers employed in the coastwise trade as you have in the foreign trade because our coastwise trade has until the time of the war and since been much larger than our overseas trade. It doesn't need anyone to advise you of that fact. I am not telling you any news in that respect.

Mr. Welch at this point re-assumed the chair.

Captain Evans: I make a motion to the effect that our chairman be authorized and empowered by the Marine Section to act as a committee of one to convey to Mr. C. D. Mallory personally and as president of the Mallory Transport Lines, Inc., the suggestion which has been made here that his company permit the efforts to be made with his assistance and co-operation to establish the safety committees on ships owned and managed by his company, and that with the backing of the Marine Section our chairman will go to them informally. I think it will be more effective that way.

The motion was carried.

Chairman Welch: Gentlemen, in regard to Captain Billiard of the Coast Guard I am very much interested. I would like to have a motion made that a committee be appointed especially to help Commander Billiard get an appropriation through for an aviation service.

The motion was made, seconded and carried.

ADJOURNMENT.

Metals Section

October 3 and 4, 1923

T. H. McKENNEY, Chairman

Superintendent of Labor and Safety, Illinois Steel Company, Chicago, Ill.

WALTER HART, Vice-Chairman

James & Laughlin Steel Company, Pittsburgh, Pa.

J. A. NORTHWOOD, Acting Secretary

Cambria Plant, Bethlehem Steel Corporation, Johnstown, Pa.

WEDNESDAY MORNING SESSION

CHAIRMAN McKENNEY: Mr. Mulligan, who was elected at the last session of the Congress to act as chairman of these sessions, recently left the employ of the Bethlehem Steel Company and engaged in private business. He tendered his resignation as chairman of the Metals Section. Mr. Walter Hart, who was elected vice-chairman, for personal reasons did not care to serve. As secretary, I was then notified by the National Safety Council that he would have to serve, and seeing no appeal, I agreed to accept the chairmanship. I believe that we all feel that it is somewhat of a loss to the section in losing the services of Mr. Mulligan. He has been always an indefatigable worker, and I am sure we will miss him in our deliberations.

Two meetings of the executive committee were called since the last Congress; one on Friday, October 20, 1922, at New York City, and another in Pittsburgh on Wednesday, March 21. The latter meeting was for the purpose of definitely lining up a program for this Section this year.

THE ESSENTIALS OF SAFETY

BENJAMIN F. FAUNCE, SUPERINTENDENT, STEEL CAR DEPARTMENT, CAMBRIA PLANT, BETHLEHEM STEEL COMPANY, JOHNSTOWN, PA.

"Hindsight is clearer than foresight,
But foresight is better and safer, old chap.
Experiment teaches, but common sense reaches
And tests bright taubles in Dame Future's lap."

"I'm telling you what Eph Landers did
The time that critter lost his fid."

He was sort of a quick, impulsive man;
When others walked, he always ran.

He never waited to calmly view,
But he got right up and slam-banged through.

Believed that the moments a fellow took
To give the future a good square look

Was simply so much wasted time;
His plan was, "Never look up; just climb."

He was yanking boulders a week ago
And things got balky and moving slow.

He strung the chain 'round a good big rock
And found that he'd lost the little block

To catch the link; it's used instid
Of a hook and link, and it's called a fid,

And Eph, he held the unhooked chain
By the ends, and he looked and he got profane.

But he couldn't find it and wouldn't wait.
He was mad as a bug and desperate.

And the crack-brained critter—what do you think?
Why, he stuck his thumb in the unhooked link.

He didn't consider that 'twan't his fid,
But the oxen started—and then he did!

He see'd his mistake, as most men do,
When the deed is done and the thing is through:

You stick your thumb where it don't belong
And the world will yank it, good and strong."

"Hindsight is clearer than foresight,
But you better ask foresight to give you a point;
And the first thing you're knowin' Old World will be goin'
And he'll laugh while you howl with your thumb out of joint."

Up to the beginning of the nineteenth century, history records mostly the achievement of individuals; and in fact until the beginning of the twentieth century nearly all accomplishment has been ascribed to some particular leader. At the present time and in fact for the last decade, it

is almost impossible to recall a movement in which any particular individual stands out with a great degree of prominence. We are learning to do things together. We solicit the aid and assistance of every individual in order to bring about desired results.

The safety movement depends almost entirely upon cooperation. Safety cannot be attained by leadership alone but must have the active support of every individual.

THOUGHTLESSNESS CAUSES 95 PER CENT OF ACCIDENTS

Safety records for the past fifteen years show that 95 per cent of accidents occur because someone failed to think properly or because someone failed to think "Safety." Millions of dollars have been spent in ways of safeguarding machinery and mechanical appliances, yet the large proportion of accidents which occur are due to thoughtlessness and are not preventable by the application of mechanical safeguards.

I can, perhaps, indicate the progress of safety in one particular plant during the last few years as follows:

In 1914 this particular plant had 3.62 per cent lost time cases per month; in 1922 the same plant had .63 per cent lost time cases per month. The difference in these figures is directly due to cooperation for safety.

Suppose you men were a body of workmen applying for work in a plant, and on being hired to fill a position you were told that every second man would be obliged to lose time due to injury each year, and that the average of the lost time would be two weeks. How many of you would want to start work?

Last year in the same plant it would take fourteen years before a man could expect to lose time due to an accident and the goal is not yet reached.

I recently asked one of our foreman, "Who is on your Safety Committee?" He enumerated five men and seemed taken a little aback when I told him that he was wrong. He had 59 men working for him and I told him that all of the 59 were his safety committee. He got the point immediately.

The best in accident prevention will not be attained until every man feels his responsibility in the matter of prevention of accident, to himself and his fellow workmen.

BETHLEHEM'S SAFETY METHODS

The following is an outline of Bethlehem Steel Company's method of handling safety work:

First: Each Department has a safety committee made up of an equal number of foremen and workmen; to each committeeman is delegated the responsibility of certain definite hazards. This committee meets once a month to review and discuss all safety matters pertaining to the department and to recommend such action as they deem proper. The department superintendent is the permanent chairman of this committee and in his executive capacity passes upon all recommendations. He is responsible for the prompt completion of safety work recommended by the

committee, and which he approves. Any items which do not meet with his approval can be referred by the department committee to the second committee known as the "permanent safety committee." The departmental safety committee has the authority to appoint additional workmen, to look after special hazards, in case the area is too great to be covered by the committeemen themselves. This is a material help in getting safety to each man in the department.

Second: The permanent safety committee is composed of one or more representatives from each department who have a definite area to cover. These men are appointed by the departmental superintendents and act as special representatives for safety work. These committeemen post safety bulletins and all safety records that come from the safety department. They look after the first-aid boxes, investigate all lost time accidents, help in training the first-aid men, and in fact handle all safety activities carried on in their respective areas. This committee meets once a month with the safety engineer, who acts as chairman of the meeting. A permanent safety committeeman receives extra compensation for this service. At this monthly meeting reports of committeemen are made, covering safety work in their department, and general plant hazards are discussed. They receive specific safety instructions and policies from the Safety Department.

Items of safety construction, involving large expenditures, and other matters which they deem advisable are referred by them to the plant safety committee, through the safety engineer.

Third: The plant safety committee meets once a month with the plant manager as chairman and is composed of all department superintendents including the management's representative. This committee outlines general safety plans and policies and takes executive action on matters referred to it by the safety engineer. It acts on matters referred to it by the safety engineer or by department superintendents.

At this meeting the plant management's representative presents departmental records of previous month's accidents and shows departmental ratings.

The old saying that, "A chain is no stronger than its weakest link," is particularly applicable to plant safety work. The elimination of accidents is dependent upon the active cooperation of every man, beginning with the plant manager and ending with the common laborer.

The great difficulty in putting across safety work is in stimulating the desire and imagination of each man for safety.

Over 50 per cent of all accidents come under the "handling of materials" classification and nearly 20 per cent more are the direct result of material being placed, or left carelessly, in improper locations. Of the total accidents only about 6 per cent are caused due to working on or around machinery.

Carelessness is the direct cause of practically every accident, and the common term "Carelessness" is more truthfully defined by the word

"Thoughtlessness." The great universal safeguard against accident is *"Thoughtfulness."* This safeguard can only be installed as one man put it "by torkin', torkin', torkin', nothing but torkin'."

There is no great difficulty in teaching men to do specific work and to do that work well. There is no great difficulty in teaching the same men "Safety Practice" and to teach them so that "Safety-First" will stick.

The ability of men to acquire knowledge of work and their ability to acquire knowledge of safety and its application, depends upon the same part of their body—from the ears up.

DISCUSSION

Dr. G. H. McKinstry (Spang Chalfant Co.): I would like to ask Mr. Faunce whether or not the safety committee meets on company time or whether they meet on their own time?

Mr. Faunce: The safety committee meets on the company's time, and the most active cooperation is not only asked for but is expected of the company—everything in the nature of safety work. A man who happened to be on salary, of course, has no extra compensation, but any man who is on piece work or tonnage or day work, has his earnings made up to him for all committee work that he attends to.

Dr. McKinstry: Do the men understand that it is necessary for them to attend the meetings?

Mr. Faunce: They certainly do. Not only that, but I will say that the men who are on those committees are rather proud of being on committees and they receive a great deal of attention, and feel as though it is a certain recognition to be on those committees.

Dr. McKinstry: Is it left to their own option whether or not they attend?

Mr. Faunce: No, it is not. Of course, sickness or anything like that, by reason of which they are absent, is different. The meetings are held during the working hours of the plant, and other meetings are generally held in the department superintendent's office, and he certainly knows if they are not there.

Mr. J. L. Junkin (Wheeling Steel Corp.): Do these committeemen wear any sort of a badge or button to show that they are members of this committee?

Mr. Faunce: The plant has a badge which is the safety emblem of the works, but it isn't anything particular. Some years ago the Bethlehem Company gave a special badge, but the old organization, after a man had served his time on the safety committees, had a special emblem to indicate that he had been a committeeman on safety, and that was a permanent badge which he wore. I thought that that was a very good idea, although we are not doing that at the present time.

APPOINTMENT OF NOMINATING COMMITTEE

Chairman McKenney: At this time I will announce the names of the Nominating Committee. They are Mr. George Barry, of the Bethlehem Steel Company, as chairman; Mr. W. W. Waters, of the National Malleable Castings Company, and Mr. Harrington Shafer, of the Colorado Fuel & Iron Company.

That committee is required to make its report not later than tomorrow morning. I would suggest that they get together as soon as possible and agree on the names which they will present for your officers for the coming year.

For our next paper we have the subject of "Safety on the Plant Railway." A telegram has been just handed me reading as follows: "Mr. George W. Barry, care of National Safety Council, Hotel Statler, Buffalo, N. Y. Impossible for me to get to Buffalo. Cancel my talk. Charles F. Dullenkopf."

Most certainly somebody here is capable of starting this talk. Looking around, I don't know of anybody who might be better than our friend Mr. Woltz of the Youngstown Sheet & Tube Company, of Youngstown, Ohio.

SAFETY ON THE PLANT RAILWAY

J. M. WOLTZ

First you have your standard-gauge operations, then your narrow-gauge or "dinky" operations, with all the various classes of cars that are used in both of these operations. The matter of protection for the different classes of cars on "dinkies" alone is a serious problem and one that presents a great many hazards from a large variety of points. You have your engines, "dinkies," that handle not only your small cars but, in many instances, the large standard-gauge equipment as well. There should be some means of safely connecting the small engine to the larger equipment. There must be some arrangement as to coupling. The ingot cars, for instance, present a hazard all their own, and it is a problem that has been worked upon to my knowledge by various companies during the time that I have been connected with this movement. In many instances these problems have been worked out successfully, various companies reaching a solution through the experience or knowledge of the engineers who handle these subjects, either safety or mechanical.

I simply want to bring out two or three points, perhaps, that others may discuss. One of them is the uses of an automatic coupler. Is it possible to devise an automatic coupler that can be used on ingot cars? Is it possible to devise an automatic coupler that may be used successfully on your dump cars? In taking care of your trackage ought all switches to be properly numbered, and should there be a bulletin or booklet containing the information as to the location and names of tracks and your switches?

Chairman McKenney: In our company we have devised an automatic coupler and are equipping all of our "dinky" equipment with them. They are working very successfully.

Mr. Johnson: (American Mutual Liability Insurance Co., Boston, Mass.): Prior to my going with the American Mutual I was with the Newport News Drydock & Shipbuilding Company as active foreman of transportation; therefore quite interested in this problem; I was also safety inspector in that plant and I naturally would couple the subject of safety with transportation. I might mention a few of the methods which we used in that department to make it safe on our plant railway.

We had standard-gauge tracks only. We operated two 60-ton steam locomotives, two 30-ton General Electric Company storage-battery locomotives, and one 20-ton General Electric Company storage-battery locomotive. All of the yard flatcars were originally received at the plant as second-hand and in bad shape. However, in the course of time they were all made safe for some rated capacity, which was stenciled on the side of the car. It was very necessary that that load be not exceeded. One of the strict rules in the department was not to move a car if it was overloaded, and that rule was strictly adhered to. All cars were equipped with standard couplers. Sometimes the connecting bar of the coupler was broken or the locking pin was broken. We made it a rule that no car was to be moved unless the automatic couplers were in perfect shape; any found damaged were immediately reported and sidetracked for repairs. When they came three of the cars had side steps and grabirons. All of the cars within two weeks had four steps and grabirons. If a step was bent or a grabiron bent or pulled loose, that car was immediately sidetracked for repair and not used until repaired. I found that that was absolutely necessary for safe operation because in transporting materials around the yard the train crews rode the cars because the hauls were sometimes long, and they had a great habit of boarding the cars after the train had attained some considerable speed. I observed several of the men boarding the cars by stepping on the journal boxes, which is a very unsafe practice which you will admit.

SAFETY BRAKING MEASURES

With respect to hauling long trains, where we did not have automatic brakes on the yard flatcars, the braking being done by direct air from the locomotive, we found it necessary for safety's sake to reduce the size of the trains to not over six cars. In the case of foreign cars coming in from the C. & O. Railroad, we hauled as high as 15 and 18 cars, but always by hooking up the automatic air. After having gotten one or two cars away and run through the yard and taken off the forward truck and a bumper on the end of the spur track, safety said "use the automatic air and keep the automatic couplers in perfect shape."

With respect to the locomotives, there was a sign placed on the forward and rear end with "Danger! Keep Off!" Train crews insisted that the men around the plant should not ride on the running-board. That was very hard sometimes to carry out, but in general it was fairly well adhered to.

The problem which was really the most questionable from the standpoint of safety was crossings. All crossings are at grade, naturally, the main highway crossings were formerly guarded by a watchman who flagged the road traffic when a train was about to pass. We did away with it, requiring the conductor of the train to advance ahead of the train and flag it himself, and we gave the right of way, wherever possible to the road traffic in order that there might be no accidents on our account to pedestrians or motor traffic.

The question of mounting a train while it was in motion was very problematical, due to the tendency of the train crews to step on the front running-board of a locomotive between the rails. It was a rule that they should mount the running-board from outside the rail and get on it when the train had just barely started, not let it come up 100 yards and attain a speed of 10 miles an hour before mounting. It is a great stunt, getting on a train that is going fast, approaching. After seeing one man step over the running-board and slip—he was not injured, fortunately—the engineer was scared to death. They decided that it was a pretty good stunt to get on the running-board from outside of the rails, and when the train was standing still or had just barely started.

The question of switches was a big one—there were some stunts and some standard switches. We secured switches with a good throw, and the switches were named, tracks named, known by their names, and the dispatches of the trains gave his train conductor orders to stop the cars in certain locations beyond certain switches, by their names and the tracks by their names, with the final result that we had no accidents of any kind whatsoever due to transportation on flatcars or foreign cars about the yard. I can't say that with respect to hauling material by cranes, or scrap in a foundry, even though with a pit, because sometimes somebody got hurt; but the transportation of materials was made safe by rigid rules and severe discipline for infringement of those rules, and maintaining standard equipment, with standard couplers and standard sidesteps and gratirons, standard switches and a standard track, laid properly.

Mr. J. A. Oartel (Carnegie Steel Co., Pittsburgh): I want to say, first, that I am glad to see the fine attendance at the Metals Section, in which I have a particular interest because I was once chairman of this section and know what it means to this executive committee to put on a good program; then again because I am a steel-mill man and know something about the hazards of the steel industry.

FIND MAN FAILURE AS CAUSE OF ACCIDENTS

When we made a survey of our serious railway accidents over a period of years, we found some startling things. We found out what caused the accidents—not overloading or defective equipment, so much, but *man failure*. I just want to tell you of a few of the causes.

Standing in the middle of the track, and stepping on the foot-board of an approaching shifting locomotive.

Coupling on the short side of a curve.

"Trespassing," as we call it; that is men going from one department to another, and crossing the track somewhere other than at regular crossings.

A railroader hanging on the side of a car which is sideswiped somewhere.

Climbing over cars in going to another place, instead of using a bridge over the track.

Those are the things that produced these serious accidents. So we planned a campaign, a "railroad drive" as we called it, and we carried it on for two years and it was very successful.

We ordered every one of our plant and department safety committees to put "Plant Railroad Drive" on their program every month for a year—that, no matter what that department was, they had to discuss plant railroad accidents in all their committee meetings and keep the subject before them; and we planned some bulletins picturing these dangerous practices that caused the accidents.

On all of our literature which we used in inter-mill work, our envelopes and things like that, we printed a slogan, "Make Railroading Safe."

Those are some of the things we did from our general office. I might mention one or two plants. Our Homestead Plant did a fine piece of work; one was to make a survey of all their tracks in order to eliminate bad curves, to eliminate bad places anywhere that they knew caused accidents; and they found out some things and they remedied a lot of them. Also at our Homestead Plant we used to have a narrow-gauge department that produced a lot of accidents, but today it is one of the safest departments in our entire company because they went after the accidents and they cleaned them up. We use automatic couplers on broad-gauge and narrow-gauge, and we just lately installed a device on our hot-metal ladles that is very effective—an automatic air cutter where a man does not need to go near it because he can stand half a mile off and watch the operation.

Mr. J. W. Benner (Homestead Plant, Carnegie Steel Co.): I will supplement the few remarks made by Mr. Oartel.

Coming down to the narrow-gauge; we have about 5,000 cars, and we started out with the common-link-and-pin coupling, and found that that was unsafe as we were smashing men's fingers and cutting off their hands. We put up a prize of \$100 for the best device for an automatic coupler, and we had a few submitted and picked out the best one, as we thought, and equipped a lot of the cars with them. We found that there was a mechanical defect in them and that we could not keep them in repair, so we abandoned that and used the Jenny Coupler, the same as on the broad-gauge cars, and we now have half of our cars equipped in that way, and so we have eliminated a great many accidents with those cars so equipped.

ALL TRACK CROSSINGS ARE ELIMINATED

Dr. G. H. McKinstry (Spang Chalfant Co.): We have an unwritten law in our plant in regard to accident prevention; that is, that accidents don't happen, they are caused, and the reason they are caused is from some improper condition. That applies to plant railways as well as to any other operation.

We have gone into the matter very thoroughly and carefully in order to see that all conditions surrounding our plant-railway equipment are as ideal as they can be made. We maintain standard clearances for a railroad of eight feet; we see that all crossings are clear and are well lighted. Our crossings are guarded by an overhead gate and also a watchman. Cars, where they enter a building, must be preceded by a switchman. No flying switches are permitted inside of the plant. No one is allowed to mount or ride on the cars except the train crew, outside of the safety engineer or superintendent of yards. On all inclines the rails are provided with stops which must be kept locked. At the approaches of all buildings there are also stops which must be kept in place. This insures the non-pushing of a car into a building until it comes to a complete stop before entering the building; the switchman must throw the stop and then precede the car in. This has eliminated practically every accident in our plant from a railway cause. The rails and crossovers are all protected by guard rails, with pulley blocks, so that no one can get their shoes caught within the rail. The tracks are laid out so that no two railroad tracks cross each other, thereby eliminating the chance of two cars coming together at a crossing.

Mr. H. G. Hensel (Youngstown Sheet & Tube Co.): At our operations we use a flat car provided with a shelter in the center of it and a railing around the head for our locomotives and our cinder ladles. This is used for the loader to ride in in making the trip from the furnace to the cinder dump. We found this advantageous in keeping men off the foot-board of the locomotive, where they are apt to ride between the engine and the ladles, and we have had some accidents along that line which came to our attention. We think this system will prevent accidents of that kind.

THURSDAY MORNING SESSION

Chairman McKenney: We will have the report of the nominating committee.

Mr. J. L. Junkin: We have nominated T. H. McKenney, Superintendent Labor & Safety, Illinois Steel Company, Chicago, Illinois, for chairman, A. C. Gibson, Industrial Manager, Spang-Chalfant Company, Pittsburgh, Pennsylvania, for vice-chairman, and Fred G. Bennet, Buckeye Steel Castings Company, Columbus, Ohio, for secretary. In deference to our chairman, I would suggest that the secretary proceed with the order of business.

Secretary Northwood: You have heard the report of the nominating committee, gentlemen, what is your pleasure?

(A motion to cast a unanimous ballot was made, seconded and carried.)

FIRE PROTECTION IN STEEL MILLS AND FOUNDRIES

J. M. WOLTZ, YOUNGSTOWN SHEET AND TUBE COMPANY, YOUNGSTOWN, OHIO

A few months ago, a man who had recently become associated with one of our large steel plants, asked why it was necessary to have such elaborate fire protection in our mills, pointing out that most of the construction was steel, concrete and brick. He expressed surprise when told that in our East Youngstown works alone we frequently receive from 75 to 100 alarms a month, and each of these called from one to three companies into action. It is due to the ability of our firemen and the almost instant response to calls of small fires that we are saved serious conflagrations. When asked by my friend what there was to burn, it was pointed out that accumulations of oil and dirt in pits, wood lockers, (where they still exist), wood piles, oil dipping and spraying tanks, oil soaked floors, flashes from rolls, motors and trolley bars, hot steel set too close to building or in cars of wood construction and railroad ties are all serious fire hazards. Oil, benzol and other inflammable materials sometimes spill and are set on fire by locomotive sparks and infrequently you get a hot metal spill that is grief for every one concerned.

The first matter that one should be familiar with and have in the starting of fire prevention work is an accurate, drawn to scale map of the plant and its structures. The fire underwriters all have such maps of risks. Then, a personal inspection of the nooks and corners of the cellars, attics, pits and floors of every building should be made, first, to see that the map is correct; second, to see what the fire hazards may be; third, to plan your location of extinguishers, hydrants and hose racks or reels, and fourth, to see that ample aisle space is provided at all times to permit the unimpeded use of the fire fighting equipment. Let us consider these four items briefly.

First. Maps are helpful and a necessity, but only helpful if accurate and up to date. When the organization is large and the executive offices may be located many miles away or quite often in a distant city, the map is usually the only source of information as to local conditions available at a moments notice. It should show, or separate maps should show, water lines whether high or low pressure, sprinkler systems, valves, gates drains, cutouts, pumps, hydrants and other hose connections, hose reels, risers, fire houses and special equipment.

Fire extinguishers whether hand or on wheels, size and kind should be spotted.

Fire boxes and fire alarm lines should be shown also, and the various zones should be definitely and accurately indicated. It is just as important to have all these things for a small plant as a large one. Of course, many mills would not have a very elaborate outlay to record on a map, but whatever there is, should be shown in detail.

MAKING THE SURVEY

Second. A careful survey of each building, shack, shanty, pit, cellar, floor and garret is essential to get an idea of the fire hazards. No place is too small, too much out of the way, too little used or too well protected

to be over looked in such a survey. Then an effort should be made to have the obvious hazards cleaned up, methods changed or discontinued. Wiping rags, oily waste, greasy overalls and working clothes are hazards. Dust of any kind is explosive when properly mixed with air. Paper and old files have made many bad fires. Electrical equipment, wiring, switches and connections should be gone over with minute care. Storage and use of wood, coal, oils, gas, gasoline, benzine, benzol, zylol, etc., should be carefully checked and regulated. No open fires, lights, cigars, pipes or cigarettes should be permitted where gases, oil or vapor is used, stored or issued, in rooms or in close proximity to them, even in the open. The location of steam and hot water pipes should be gone over to check against the chance of wood, paper or other inflammable material being or coming in contact with them. Heating apparatus, stoves, electric, coal or gas should be examined and connections checked. Proper protection under and on all sides should be provided. Chemicals and compounds should be checked as to proper storage, containers and use. Paper or cardboard shades for lamps of any description should not be permitted. All openings through which steam, hot air or stove pipes issue, should be properly protected by fire resistant material. This is particularly important if structures are of wood.

Waste and its disposal is an important matter. These are a few, very few of the obvious hazards. Hundreds of others just as dangerous, perhaps, are familiar to many of you and should be sought for assiduously as those mentioned.

Third. If your fire fighting apparatus is not distributed to advantage and where it is easily of access it is a wilful and criminal waste of money. A few moments between the inception of a fire and its extinguishment may mean a serious conflagration, perhaps heavy property and life loss, or no damage at all. So when you locate your hose, extinguishers, reels, etc., confer with your operative department as well as your engineering. Fire doors should be checked daily as the only safe proposition, as these inspections frequently indicate a defect sufficiently serious to prevent their automatic action.

In order to care for fires at inaccessible places it is necessary to arrange special facilities. At each of our blast furnaces we ran a 2½ inch water line along the stairway leading to the top of the stoves and along the platforms to which is attached a hundred foot length of 1¼ inch rubber, wire wrapped hose with regular nozzle having ⅝ inch tip. On an alarm from Gamewell Box 317 which indicates, "Fire on Top of Furnaces" two firemen hasten to the Boiler House and speed up the pump attached to the special risers, raising the pressure from the normal (110 lbs.) to 250. The hosemen and nozzle men, along with the captain rush up the flight of steps and stretch the line, going anywhere around the top of the furnace. Fires at this point usually arise from the lighted gas igniting the oil soaked dust, as well as the oil on the cable and wheel of the hoist.

Fourth. Space should be provided to operate your fire fighting equipment. Do not permit material to be piled in front of, over or around the

reels, and hose houses. Aisles with ample passages to haul the carts and extinguishers mounted on wheels to transport them through the building and yards should be provided and always kept clear of obstructions.

The inspection and maintenance of your equipment is just as important an item as its installation, perhaps more so, for if you have equipment installed, naturally you look to its being a protection in case of need, and if it should not be in first class working condition or not in its proper place, there may arise a serious situation. So that frequent and thorough inspection of all equipment should be made. Forms and records must be provided as a proper check on such work. You can not afford to take a chance in such a matter. Systematic and careful attention to every detail is essential.

ORGANIZATION OF FIRE FIGHTERS

These are, as I recognize this work, the fundamentals. Next, we must consider organization, training and records.

Organization. This, of course, depends entirely upon the plant, its size, product, location as to surrounding hazards, installed fire fighting equipment, hours operated and protection available from outside sources.

The careful selection of a head for your Fire Brigade is as important as any other executive, for upon him and his lieutenants and their efficiency, may rest the future success or failure (by destruction from fire) of the plant. He must be a diplomat, as he will be in more or less constant contact with the operating end, and, of course, will have intimate association with the entire force of employees. He should know what is safe to use on the classes of fires that he will have to handle and be equally familiar with material that is difficult and dangerous to handle. His familiarity with the power lines, water supply, exits, fire escapes, etc., will be as a matter of fact come with his work. When a fire exists his authority should be supreme in the threatened district, superseding all operating officials.

If the plant is large enough there should be an assistant for night duty, perhaps, also for day relief.

Companies may be composed of from six to twelve men. A foreman, or captain, lieutenant, one hydrantman, two to four nozzlemen and the rest hosemen.

In some plants salvage corps, ladder truck companies and other special organizations may be required.

From your companies you make up your battalions, and from these your brigade. The number of companies in a battalion will depend entirely upon the arbitrary divisions you make in your works. We have as few as two companies in several of our battalions and the largest has ten. There are a total of 524 employees in our Youngstown District fire brigades.

Each battalion has its commander. One of the company captains is usually designated as assistant. Companies are composed of workmen who can, as a rule be best spared from ordinary operations, but should

have a considerable number of mechanical men, such as electricians, pipe fitters, etc., as these men are, as a rule, scattered throughout your plant, know its electrical hazards, where power can be cut off from affected areas without disturbing others, know the water lines, gates, and valves. It's a highly important matter to know if it's safe to throw water on a power line or not.

Fire headquarters should be located as centrally as possible. There should be space enough to house wheeled or motor equipment, work and repair shops should be made at this place. All repairs to fire equipment should be made here. Hose should be inspected, repaired and dried here and all used equipment should either be cleaned, inspected or refilled at this place or from materials kept there. Here all records should be kept and reports made. To do this requires certain inspectors, repairmen, operators and clerks.

HOW RECORDS ARE KEPT

In our plant we require a twice daily inspection of all fire equipment. This is done by our patrolmen on their regular rounds, and a written report of the condition or irregularities, if any, is made at the end of each turn. In case used or empty equipment is found by patrolman, he at once uses the phone to notify fire headquarters and a man is sent out to bring in the equipment or refill it and replace it in its proper station. A report of this is made by the fire inspector and this is recorded on a card, and in case an extinguisher is refilled the metal tag in the apparatus is punched with the month, day and year. A check set of cards are made up with the record of each extinguisher showing location, number, make, size, and last date filled. These are filed by months, and when any soda and acid extinguisher has been unused for twelve months, it is discharged and refilled, proper record made on metal tag and the card. The card is then set back for twelve months, and when that time elapses it automatically comes up to action again, provided, of course, it has not been used and refilled in the meantime.

Captains are required to make reports of all responses to alarms and are required to hold at least two drills each month. These are also reported on forms. From these reports we make up our pay roll. We pay \$1.00 per month to each member provided he attends these drills. In addition he is paid 25c for each alarm responded to upon call and if hose is laid is paid at the rate of 50c per hour for every hour he is upon fire duty. This is reported by the captains upon their regular forms. These sums are paid to the employees semi-annually after the 1st of July and 1st of January of each year. In the winter we have a dinner at our works offices, with talks, singing, music, etc., and vouchers are distributed. In the summer we have a field meet with various contests, band music, feed and voucher distribution. The Youngstown district pay will run about ten thousand dollars (\$10,000) per year.

Hose is tested at stated intervals. Each section is recorded on a card and repairs, inspection and station is noted. It is taken from its station, water run through it, outside casing washed, drained and dried, twice

yearly. All hose houses have a red lamp in front that is lighted at night. They are also provided with an electric lamp inside the house that lights automatically when the doors are opened.

All hose houses and boxes are kept sealed. If a seal is found broken by the patrolman as he makes his rounds he reports it at once to fire headquarters. An inspector visits the station, checks up the contents, replaces what may be missing and reseals it.

Hose and all other fire equipment, including hydrants should be used for fire purposes only. This should be a hard and fast rule. The fire chief being the only person who can, in case of emergency, permit the use of fire equipment for other purposes. When our fire hose becomes worn or old it is turned over to the operating departments, a band of red about a foot wide painted around each end of the discarded hose and it can then be used for cleaning, opening sewers, etc.

EQUIPMENT USED

We use 1 quart, 2 quart, 1 gallon and 10 gallon pyrene extinguishers. 2½, 5, 20, and 40 gallon soda and acid and 2½ and 40 gallon fire foam extinguishers. These machines are distributed according to the requirements of the works. The pyrenes where there are electrical hazards. The soda and acids where the danger is greatest from wood fires and the fire foam where the oil, light oil, and gas fires are the outstanding hazards. All of our power houses have 10 gallon Tetrachloride machines. These are operated by air pressure and have paid for themselves many times over. In winter the soda and acid and fire foam machines are kept in electrically or steam heated compartments. All apparatus is numbered and its stations are numbered similarly.

Roofs are reached by steel ladders equipped with steel safety backs. Hose boxes with full equipment of hose, wrenches, nozzles, ropes, axes, etc., are located on tops of buildings. Risers from the ground to roof are placed at convenient points. This obviates the hauling of hose from the ground to building tops, and the attending labor and danger of this work, especially under cold and icy conditions. Railed cross-overs are provided between high and low bays.

We have a triple combination, 750 gallon, American La France pumper. This machine responds to second alarms only, except in our housing plants. We have a Gamewell Fire Alarm System with 71 boxes divided into zones and use the Gamewell Police call system also.

Fire alarms sound only in the zone from which it is desired to call companies, that is the zone from which the alarm is sent. If necessary to call additional companies any one or all zones can be connected and as much of the man power or equipment of the fire brigade may be summoned as is needed and this has the additional advantage of only calling to fires the force really needed and not disturbing the rest of your employees.

When a fire alarm is received at police headquarters (this is where our board, switches, etc, are located as we have an operator on duty here covering the 24 hours) he fills in a card form addressed to the superintendent of the department from which the alarm was sent, and incloses a blank form upon which the superintendent reports to the safety department

the cause of the fire and damage sustained. This then goes to our engineering department. Here the engineer in charge of our insurance gets in touch with the underwriters adjusters and the damage is estimated. All of our insurance is carried by outside old line fire insurance companies. In case of actual damage to insured property the safety department and district superintendent are notified by phone by both police headquarters and department superintendents, so that immediate investigations and inventories can be made with the insurance adjusters.

On the first of the month a form is sent to each head of a department upon which he makes a report of new buildings, material, and equipment added to his department, also of buildings torn down, abandoned machinery scrapped or moved and material or stock covered by insurance used, moved or discarded. This is sent to the insurance bureau of engineering department, to check against their records. This report has been the means of turning up some rather surprising facts.

COOPERATION WITH CITY DEPARTMENT

We have a city alarm box in police headquarters that is used to call the city department when a fire has the appearance of being at all dangerous. We consider our department as a sort of first aid measure and do not hesitate to ask for help if there is any apparent need for it. When the city apparatus responds the officials of it assume full control and direction of the work of putting out the blaze and our aim is to cooperate as ordered.

As our plants cover many miles of territory, much of which is difficult to reach by wagon or truck, we have equipped each of our standard gauge locomotives with 1½ inch rubber lined hose and nozzles carried in the cab or on reels on the tanks. The water is supplied from the injector line. Nozzles are protected to prevent burns from heated water. We have found this is to be well worth while as our engines have extinguished many an incipient fire that would have developed into serious consequences had there been no ready fire fighting apparatus at hand. All of our locomotives are also equipped with stretcher, blanket and tourniquet.

This in a general way covers our own organization, as well as a number of other of the largest companies who were kind enough to respond to my request for information as to their work, organization and equipment.

We have not covered coke, by-product and benzol plants in this paper. While their problems are not by any means complicated, some special precautions are called for to provide adequate fire protection and a great deal more than ordinary care is needed in the regular operations.

Our triple combination pumper carries in addition to the regular equipment, hand searchlights and approved universal gas masks for use in heavy smoke, fumes and gases.

Mr. Woltz shows two reels of motion pictures.

DISCUSSION

Mr. F. A. Epps: I would like to ask Mr. Woltz about the ten gallon tetrachloride extinguishers. It has been my impression that tetrachloride

has never been used in large quantities, only in the quart and a half size, primarily because of the danger of letting larger quantities of it loose, particularly where the ventilation might not be good.

Mr. Woltz: You understand the capacity in which it acts? It forms a gas which is a blanket and shuts off combustion. If it is to be used in places with strong drafts, you are not going to get much benefit from the use of your fluid.

Mr. Epps: At the same time tetrachloride gas itself is a good anesthetic. You apply it on a fire and it brings down hydrochloric acid gas, both of which are poisonous. Your operator has got to lie down close to the floor, and he is going to get in the area of fumes.

Mr. A. C. Germaine (Minnesota Steel Company): We have had ten gallon extinguishers in our plant, and with each one we have army gas masks. We have installed these in our power houses and sub-stations all over in the plant for more than a year. We have had some fires in confined places, and we have not experienced any trouble so far. Personally, I would rather fight fire with carbon tetrachloride with a mask on, than take a chance with something else in extinguishing electric fires.

Secretary Northwood: I'd like to ask Mr. Woltz how often he uses his locomotive equipment for fire protection?

Mr. Woltz: In eighteen months time we have averaged five fires each month that have been put out exclusively by the locomotives. That includes fence fires, and in two instances rather bad field grass fires, and as you all know in your larger plants in making changes of the switches, etc., there is a great accumulation of old ties that are piled up some place until they can be broken up and burned in your furnace, and we have had a number of fires, bad ones too, in old tie storage yards, one in a board yard that we have, and two that threatened to be rather serious because they are difficult to handle, in turnings. We had about 500 turnings that caught fire, and had it not been that one of these locomotives was close at hand and we were able to put it out almost as soon as it caught fire, I know what we would have had, and it certainly is a heart-breaking job to get a crane in there and tear that to pieces so as to get at your burning turnings.

RELATION OF THE MEDICAL AND SAFETY DEPARTMENTS

G. H. MCKINSTY, M.D., SPANG-CHALFONT COMPANY, PITTSBURGH, PA.

The safety department and the medical department must be "buddies." They must be square to each other.

I have heard both sides and I know that there are many cases of misunderstandings. Each takes a rap at the other. I will give you my experiences in this matter.

It might be well to go back to the time, some seven years ago, when I started in my present position. The Safety Movement was comparatively new at that time, but nevertheless, functioning quite well. A new dispensary had been opened just before I came to the company..

I was introduced to the plant manager and employees through the so-called safety engineer. I had been practicing general medicine and really felt that I knew quite a bit about handling people. I must confess that, at the start of my connection with industry, I had to learn other methods of attack.

We established a medical service in connection with the regular compensation work—all of which were gratis. Employees are privileged to consult the writer about anything that might be on their minds. A sufficient quantity of drugs are kept on hand to take care of brief and ambulatory ills. We make house calls in some cases of illness such as tonsillitis and colds, knowing that the average workman will not consult a physician for such slight ills and with the view of cutting down his lost time.

I was far more reticent then than now—a bit backward about making a bid for business. I depended on the safety man to hunt it up for me. He was the *laisson officer* for the hospital. On his trips through the mills in the early days (he made a lot of special ones just for me) he would make it his business to acquaint the foremen with my duties and would tell them that I was a fine man. When the men complained of headaches, colds, diarrhea, constipation, etc.; they were forthwith sent to me.

I gradually shook off some of my self-consciousness and ventured forth among the men on the job. I was received cordially and as I came to know the foremen I began stirring up a little business for myself. I tried to "sell" the hospital and its services to the foremen so that they, in turn, would push it with the men. I tried to gain the confidence of the men—tried to make them feel I was heart and soul for them. It is my belief, and I think you will agree with me, that a plant physician represents to the workmen, the management itself—only in imagination, of course—and if he can arouse the faith of the workmen in himself he can create, thereby, a strong attachment to the management.

PERSONAL OBSERVATION OF WORKMEN

When some particular workman makes more than the average number of trips to my office with an accident slip, I decide he needs immediate and close observation. In this work, the safety man is my best bet. He watches this man in the shop when I can't get away from my work to do it myself. He reports the results of his observation and together we go over the possible solutions. Whatever I tell the safety man about the personal history of an employee is always a secret between just us two. If it is in the form of a written card or letter, it is locked up in the safety man's drawer or safe and never gets beyond him and myself.

Frequently, I go to the shop where one of my patients works and watch him on the job. In this way, I can often detect causes of disturbances which are bothering the man. If a man needs light work, I give him a note to his foreman requesting that he be given something easier for the time being. The foremen, as a general rule, receive these requests without question.

I have great opportunities to get my message before the foremen during foremen's meetings. Ever since "Gibby," the safety man, introduced me to them as "a Damn good scout," they have been after me to talk to them when they get together and, of course, I never miss an opportunity.

However, whenever I do have a set-to with a foreman I get my safety sidekick and break the news gently to him. He hotfoots it to the foreman, and with the diplomacy of a Lloyd George, irons out the matter much to my advantage.

There are large plants where the safety and medical departments are friendly only to that extent necessary for the safety man and the medical man to hold their respective jobs. Each has a poor opinion of the other. I heard of one plant which employs approximately 9,000 men the other day. A new safety director was installed in his official capacity and inherited a physician who had been with the company for some time. The safety man was as good a safety man as the physician was a good physician but whenever they collided there were sparks.

These two men were at loggerheads for months before they finally saw each other in the right light. In this case, I think the fault could be laid to the company for not introducing the men properly, outlining the plant policies and the respective duties of each man and asking for wholehearted cooperation.

In my own case, I know I was not as cooperative as I should have been. I inherited "Gibby" and we had rough sledding for awhile. Mild tempered as "Gibby" really is, he "saw red" many a time when I was obstinate. Here too, no policy had been outlined at the start. I was not sold on the proposition as I should have been by the powers that be. "Gibby" and I were simply, to our minds, cogs in the machine and were supposed to function automatically. But we are teaming in fine shape now, as I have previously indicated.

SAFETY MEN CAN AID PHYSICIANS IN MANY WAYS

You safety men can ease the way for the medical men a great deal. The plant physician is only human and makes errors in judgment of men occasionally, or he may lack tact insofar that he bawls out a man for not reporting an injury and the medical department thereby loses a friend. It is up to the safety men to do these jobs. The medical department should be there only for service and it is not up to the doctor to do any disciplining.

When you have a case of infection caused by neglect of a workman to come to the medical department for treatment, you should, in reprimanding him, try to convey to the man that you got your information through the daily reports of the hospital in the superintendent's office and not from the hospital direct. This will lessen the general idea that the doctor is a tattler.

In your travels through the mill you will hear criticisms of the physician and the medical department, just and unjust. Drop into the hospital as you find time and tell us how we stack up with the men. Good or

bad, it can't hurt; it can only help the medical department. If that department is in bad, it will be its duty to rectify its standing; if it is in good, then shall the standard hold.

DISCUSSION

Dr. Chas. J. Steim, (Medical Director, Philadelphia Company, Pittsburgh, Pa.): Mr. Chairman, I am quite surprised to hear that there could possibly be any friction between a medical department and a safety department. In the first place, a man wouldn't be a doctor at all if he hasn't made up his mind to dedicate his life to service, and he would certainly not be an industrial physician or plant surgeon, because there isn't enough money in it. Look upon it as a service department. A medical department in any industry, or anywhere else for that matter, is, strictly speaking, a service department, and can't, in any way, interfere with the realization of the ambitions of any individual department in an organization. It can only help, and I am quite sure that there will never be any friction between the safety department and the medical department, because safety work and medical service are so closely interwoven: they are absolutely one and the same thing.

Dr. C. F. N. Schram, (Chief Surgeon, Fairbanks, Morse & Company, Beloit, Wisconsin): I came especially to hear Dr. McKinstry's paper this morning, and I am surprised that his experience is something like mine. At the time I went to Fairbanks, Morse & Company, the safety man was not introduced to me as the safety man. He just sauntered in once upon a time. I met him in that way. The hospital, or first aid room is often hooked up under your safety department previous to their hiring a physician. Now, that, at the start, is probably the logical way, but at the same time, it is just as logical after the physician comes in, and the safety department gives orders, to have a little friction arise. The patient is the physician's patient, and when the safety man orders him into the hospital, or begins to order him back on the job, which he has been doing previous to the physician's coming, it just makes a little friction, and we just ironed it out. That is all there is to it.

The executives that are here, or the safety men who are going to employ a physician—if you can start the ball rolling right at the beginning with a good, square understanding it will work out all right.

In regard to your question as to the attitude of outside physicians—I struck the same thing with thirty or thirty-five physicians in a small town of 22,000, and they certainly did hand it to me when I first went there. My experience has been almost the same as Dr. McKinstry's. I went along and minded my own business, gave just as good treatment as I knew how. Every time there was an operative case, I called the family physician; he got in on that operation, and while I do not want to blow my own horn at all, at the present time I am president of the local club of physicians in Beloit.

There is nothing phenomenal about it; I played fair with them, just as I have done my very best to play fair with the man who is out working in the shop—it doesn't make any difference whether he is an executive or a yard switchman.

Mr. Peake (American Radiator Company): I would like to raise the question as to what is said to employees when they come for first aid in pointing out their weakness or carelessness—whether that is thought advisable, and whether it is not dangerous.

Mr. S. H. Reamer, (Safety Engineer, Cadillac Motor Car Company, Detroit, Michigan): We have three doctors in our different shops, and we have a series of accident hazards that we make it a point to get out. They know the conditions. They will talk to the workman far better than I can, and I find we are getting elegant results. Of course, the doctors and I work together, shoulder to shoulder, at all times. The only kick I have, is that they give me too much work.

Mr. D. C. Hunter, (National Cash Register Company, Dayton, Ohio): We had a chap come in who had lost his thumb in a punch press. I immediately started to question him as to how it happened. "It is all your fault," he said. I saw right away he was not in a frame of mind to question any further about how the accident happened. I let it go for a day or two, and got talking to him again, and I found out he was in a different frame of mind. He told us he had deliberately left his hand under the press when he tripped it.

It brings out the need in many cases when a man comes into the hospital is not the time to question him regarding how the accident happened. I think it is better to wait a few days to get it straightened out before you go into that. I think you get better results.

STEEL INDUSTRY COMMENDED

Dr. L. W. Chaney (U. S. Bureau of Labor Statistics, Washington, D. C.): A certain phase of the figures which I have been compiling now for many years struck my attention the other day, and I'd like to have them stick in your minds as they have in mine.

I have been immensely proud of the accomplishments of the iron and steel industry in the matter of accident prevention. It is most remarkable record, and no one else in American industry has yet touched the same accomplishment. I don't mean that there aren't accidents, but in comparison with the hazard which you encounter, and in comparison with the conditions in which the iron and steel industry was ten years ago or more, you have accomplished a very remarkable result.

Just within a few weeks past I was compiling the figures for the year 1922 for the industry, and I happened at the same time to compile the figures for about 50 per cent of the industry which included the plants which had for the longest time and for the most energetic accident prevention work, stood out among the plants of the iron and steel industry.

Now, here are two figures that I would like to have you meditate upon. The 50 per cent of the industry which has for the longest time and with the greatest energy pushed the safety movement have an index figure

for the frequency of their accidents of 13. The industry as a whole has an index figure of 33. Now do you see what that means? There are some of you who are a good deal above the average in order to bring up the average to that point.

That figure of 33 was a creditable figure, but if the best plants are getting an index of 13, and the industry as a whole is getting an index figure of 33, there is still something for somebody to do. There isn't any reason why any iron and steel plant shouldn't be as good as the best.

There is just one thing more I want to say. I hope that every one of you, if you haven't done it already, will get hold of the last bulletin on this subject which the Bureau of Labor Statistics has published, Bulletin No. 339. It is the most generally informing bulletin on accidents that the bureau has put out. It doesn't cover your particular industry with the same thoroughness as some others which we have prepared, but for general information it covers more ground, and I believe will have more matters of interest for you than any other bulletin we have put out. If you supplement that by asking for the October number of the Monthly Labor Review, you will have the situation so far as the iron and steel industry is concerned, brought down to date.

Mr. John A. Oartel (Safety Director, Carnegie Steel Company, Pittsburgh): I want to say a word about Dr. Chaney's remarks. I doubt whether we all realize the contribution that he is making to accident prevention work. What he said this morning, in my mind, is one of the biggest contributions that has been made to safety, and I think it should have publicity in the headlines somewhere. This great iron and steel industry of America, which we all know, is hazardous, but is really getting somewhere in accident prevention work.

ADJOURNMENT.

Mining Section

October 2, 3, 4, 1923

B. F. TILLSON, Chairman

Assistant Superintendent, New Jersey Zinc Company, Franklin, N. J.

G. M. GILLETTE, First Vice-Chairman

General Manager, The Consolidation Coal Company, Frostburg, Md.

J. L. BOARDMAN, Second Vice-Chairman

Safety Engineer, Anaconda Copper Mining Company, Butte, Mont.

WILLIAM CONNIBEAR, Third Vice-Chairman

Cleveland-Cliffs Mining Company, Ishpeming, Mich.

R. H. SEIP, Secretary

Safety Engineer, New Jersey Zinc Company, Franklin, N. J.

TUESDAY MORNING SESSION

REPORT OF CHAIRMAN

THIS industrial section was organized in Philadelphia, October 1, 1915. A total of 121 addresses have been made before this section since its inception. These addresses totalled 1,157 pages. Fifty-five with 550 pages were on general mining subjects; 14, with 113 pages, on anthracite coal mining; 19, with 126 pages, on bituminous coal mining; 22, with 190 pages, on metal mining and 11, with 178 pages, on miscellaneous subjects.

There has been criticism, as is quite right and quite healthy, of our activities. Only this year there was forwarded to the Chairman a criticism of a metal company that the bulletin service and the other service of the Mining Section of the National Safety Council was all very good as far as it went, but the trouble was that it was mostly coal mining; and within the same week another letter was forwarded to me from a coal-mining company which you would think had been copied directly from the metal-mining letter. It said that the service was all very well, but there was not enough time and attention devoted to coal mining.

Rather a happy coincidence; so long as we have objections from both sides of the fence, we are probably straddling it as well as could be hoped.

The fact remains that the chief objection from every one is that they are not getting enough service, not enough bulletins, or enough of anything which interests them in safety. In one way that is a healthy

viewpoint and could best be cured if these same people who are not getting enough would try to give something. If we all take that attitude, there will be a fund of material that will be of benefit to all of us.

It has been advocated by your chairman in the past that it would be well if this section would raise more funds so that more service could be forthcoming. The service the companies get for a dollar in the National Safety Council is absurdly large. It has been my criticism for a number of years in the executive committee of the National Safety Council that our dues are so small that we are not really respected by the executives of industry as we would be if they had an investment in our service really comparable with the services that ought to be given.

I hope that the time will come when the Mining Section of the National Safety Council will successfully prosecute a campaign for increasing the dues of its members to a sum, say, equal to the dues that those members are paying to the general National Safety Council, this increment of dues to be applied solely to the activities of the Mining Section, that is, to be returned in direct services to the mining companies who are members of the National Safety Council and of the Mining Section. Even that would not supply enough funds to give the service which we would all like to have, but it would be much more than we are now receiving.

When one makes a fundamental investment, every addition to that fundamental investment should produce proportionately greater returns. There are certain overhead and fixed charges which, in any organization, are considerable, and when you add a revenue above that your returns will be more than proportional to the increased expenditure.

During the past two years we have been fortunate in having an arrangement with the United States Bureau of Mines whereby we have received assistance in maintaining a safety engineer in the field representing solely the mining industry and the activities of the Mining Section of the National Safety Council. I refer to the services which we have had from Mr. C. L. Colburn, who before he was delegated to co-operate with our Mining Section in this capacity, was serving as Assistant Chief Mining Engineer of the United States Bureau of Mines.

Other sections of the National Safety Council have not had as much service as we have. Ever since we organized we have had pre-prints of those papers that arrived in time. These were distributed to the members in galley form. So far as I know that has never been provided at any other meeting of the National Safety Council.

Then again, Uncle Sam has expended for us \$6,600 or \$6,700 a year to pay the traveling expenses and salary of his mining engineer while he was serving as safety engineer for our section. Then again, we also got from the general fund of the National Safety Council an appropriation of \$1,200 a year for two years to supplement this investment of the Government in paying the expenses of this service. This we have enjoyed for two years. In this way also we have received more from the Council than our members have paid in.

The Cooperative arrangement was not financed in the appropriation for the year 1923-24, so that although we are still strongly cooperating

with the United States Bureau of Mines as we always have and always hope to, we shall not have the services of a field service man for the balance of this year or next year, either.

Apparently the director of the Bureau of Mines felt that in having carried on the experiment for two years and demonstrated its possibilities to the Mining Section, it was only proper for them to take up the entire burden if they felt the services were worthy of the investment, so if you desire that service to be reinstated, the money must be raised somewhere. It may be necessary, therefore, as already suggested, to have specific additional dues for the Mining Section.

APPOINTMENT OF NOMINATING COMMITTEE .

Chairman Tillson: I will appoint Mr. J. T. Ryan, chairman of the nominating committee, to canvass the field among you and present a slate of candidates for the officers. With Mr. Ryan I will appoint Mr. R. H. Seip and Mr. G. J. Johnson.

We will now have, gentlemen, a report from Mr C. L. Colburn.

REPORT OF SAFETY SERVICE ENGINEER

During a two-year period the Mining Section of the National Safety Council, in cooperation with the U. S. Bureau of Mines, engaged in safety service work for the benefit of the mining members of the council. Acting under the terms of this cooperation, the U. S. Bureau of Mines assigned a member of its staff to the cooperative work. The salary of this engineer was paid by the bureau, but his traveling expenses were paid partly by the government and partly by the National Safety Council.

Under the cooperative plan, the mining engineer assigned to this work was instructed to visit the mining-company members of the National Safety Council, to acquaint these companies with the scope of the technical service available to them through the cooperation, and to familiarize himself with the best methods of preventing accidents, as demonstrated by the mining companies who are most advanced in that respect; to establish cordial relations with the mine superintendents and foremen at the operations he visited, and, as occasion permitted, to disseminate suggestions directed toward improved practices, yet nevertheless free from criticism of the practices noted; to collect photographs, blue prints, sketches and other information suitable for the preparation of "Safe Practices" leaflets of the National Safety Council and bulletins, technical papers and other publications of the Bureau of Mines; to coordinate and develop the safety work of the Mining Section of the National Safety Council with the safety work of the Bureau of Mines; to disseminate among the operators, foremen and workmen in the mining industry, by personal visits and orally, with more concrete application and detail than written communications would probably provide, the arguments for and against increased or new activity along any lines of endeavor or research, looking to increased safety in the mining industry.

At the beginning no one had an idea how this cooperation would work out. Almost everyone thought that success depended upon the ability of the engineer to visit mines, collect information, and impart that information to other mines. During the first year 78 mines were visited, which is about the maximum one man can visit during a year if at the same time he is called upon to write articles, prepare bulletins, attend safety meetings, and give safety talks. These 78 mines did not cover the entire membership of the council, so with one man in the field it was found impossible to give each member a personal visit with specific safety service. It was also found that in visiting the mines the engineer was collecting information rather than imparting information. The different members of the council had different ways of doing things. To weigh the advantages and disadvantages of each method would have taken more time than it was practical to give.

After the first year it was decided to devise a way for the different member companies to get together and teach one another. Therefore, during the second year several safety conferences were arranged and the different mining companies were requested to send delegates who could profit most by the discussion. This plan worked out splendidly. A safety engineer, superintendent or foreman with a pet safety idea had an opportunity to present that idea to a meeting composed of men from other mines. In the discussion that followed the practicability of his idea could then be attacked from every angle. These safety conferences became popular. Every section voted to repeat these conferences. Therefore, during the second year of the cooperation the engineer visited only 49 mines, but was required to travel farther and to make more safety talks.

DEVELOPMENT OF SECTIONAL CONFERENCE PLAN

The development of the sectional conference plan promises to accomplish more for safety than any other activity that can be promoted by the Mining Section of the Council. In addition to arranging conferences there are other specific duties that must be imposed upon the cooperative safety engineer. He must prepare articles for the National Safety News, must collect material for safety bulletins and must assist in any other special work that comes up from time to time.

This summarizes the manner in which the safety service work developed. Other suggestions for this service were made which should be discussed.

Advisability of a representative of the National Safety Council making mine inspection—This idea is not practicable. Mine inspections are being made by four different agencies, and any work in this line by the National Safety Council would be duplicating work that can be better performed by others. Inspections are made by inspectors selected by the mining companies, by state officials and by insurance companies. In addition to this the U. S. Bureau of Mines has a corps of trained safety engineers who will make inspections and give recommendations gratis to those mines asking for such service. To give service to its members effectively, it would be necessary for the National Safety Council to

employ a large corps of inspectors for the area to be covered is large. It is impossible for one safety engineer to visit every mining section in the country and to make the careful, detailed study necessary to give constructive safety suggestions to the companies thus visited.

Safety engineer enthusing foreman—The suggestion that the safety engineer interview the mine foreman in order to make him enthusiastic for safety work, is good, in that it recognizes that mine safety, to be effective, must have the full support of the foreman, who is the most important person to create the desired enthusiasm for safety. It also overlooks the fact that in most cases the management has not been fully sold to the safety idea, and for that reason the foreman is not the key-man to the situation. If the management is determined to install the safety idea throughout the mine, then it is comparatively easy to enlist the efficient support of the foreman. The best way to educate the mine foreman and other mine bosses is through sectional conferences.

Safety engineer becoming an authority on mine safety matters—The opinion was expressed that a safety engineer, having close contact with all the mine-safety work in the country, would become an authority on the subject. It is true that the engineer notes a variety of safety plans being put into effect under a diversity of conditions. Such an experience is bound to broaden him and give him an unusual store of information. His knowledge will, of course, be limited by his ability, and if he becomes an authority on mine safety he must be a brilliant engineer. There is not much probability that any man will become so well informed on mine safety that he will be an authority on every phase of the subject. It is unnecessary for the traveling safety engineer to become an encyclopedia on mine safety. It is his province to see that the different ideas as to mine safety are brought out for discussion and for adoption by those who recognize their value and are in a position to use them.

The foregoing discussion shows how the scheme for developing the safety service has taken form as a result of the cooperative agreement, the following is a more detailed account of the activity of the mining engineer assigned by the Bureau of Mines to conduct this cooperation.

During the first year the work divided itself into four parts as follows: first, visits to mines for the purpose of gaining and imparting information regarding safety; second, writing, articles describing commendable safety methods and new ideas regarding safety for the National Safety News; third, taking photographs of safe and unsafe practices and preparing safety bulletins; fourth, making talks on safety where the opportunity presented itself at society meetings and meetings of miners.

During the first year 78 mines and 14 mills were visited. Trips were made through these mines and mills to gain intimate knowledge of the working conditions and the measures taken to provide safety for the workmen. Forty-two of the mines visited were coal, 31 were metal, and five were non-metal. Of the 14 mills visited, six were breakers or coal-washing plants, five were concentration mills at metal mines, and three were mills connected with non-metal mines.

These mines and mills were in the following mining districts: the anthracite district of eastern Pennsylvania; the bituminous district of western Pennsylvania, western Maryland, and West Virginia; the Lake Superior copper and iron districts; the coal-mining districts of central and southern Illinois, central Indiana, eastern Ohio, Kentucky, Alabama, southern Colorado, Utah, and Washington; the metal-mining districts in Colorado, Utah, and the Coeur d'Alene region in Idaho; the lead belt in southeastern Missouri; the bauxite (aluminum) mines in Arkansas; the iron districts in Alabama, the phosphate mines in Florida; the salt mines in Louisiana; and the zinc and copper mines in eastern Tennessee.

During the first year 17 articles were prepared for publication in the *National Safety News*.

Ten talks on safety subjects and miscellaneous work were made at mining meetings, and conferences were held with state mine inspectors and state compensation commissioners regarding the different states adopting a standard form for the reporting of mine accidents.

During the second year of the cooperation the engineer visited 49 different mines, one smelter, and three mills. He wrote 28 articles dealing with safety. These were published in the *National Safety News*.

The safety service engineer took 261 photographs in and about mines, showing safe and unsafe practices. From these photographs 32 safety bulletins were prepared.

ASSISTS IN MINE SAFETY CONFERENCES

The safety engineer assisted in the Mine Safety Conference held in Duluth, Minn., October 26 and 27, 1922, where more than 80 delegates were present from the Lake Superior Iron Mines. He promoted the Northwest Mine Safety Conference held in Butte, Mont., November 20, 21 and 22, 1922. One hundred and twenty-five picked men were present at this conference, representing all the important mining districts in the Northwest. He promoted and acted as chairman of the Southwest Mine Safety Conference held in Globe, Ariz., March 19 and 20, 1923. One hundred and ten picked delegates were present, representing mining companies in the Southwest and Mexico.

The mine safety engineer was asked during the second year to address 16 different meetings on mine safety. It was necessary for him to travel 26,747 miles by rail in order to carry on the work during that year.

The above recital covers the cooperation up to July 1, 1923, at which time the cooperation of the Bureau of Mines with the Joseph A. Holmes Safety Association was added to the duties of the safety engineer. Since July 1, the National Safety Council has contributed nothing toward the traveling expenses of the safety engineer which has materially decreased his traveling appropriation.

Between July 1 and October 1, 1923, the safety engineer prepared three articles for the *National Safety News*, and furnished material for 8 bulletins.

He visited Duluth, Minn., and had several conferences to aid in making arrangements for the Mine Safety Conference of the Lake Superior Mining Section of the National Safety Council, held August 28 and 29, 1923.

He attended the First-Aid and Mine-Rescue Meet at Salt Lake City, Utah, August 27, 28 and 29, 1923, and presented the National Safety Council Challenge Cup and gold medals to the winning team, and the silver and bronze medals to the second and third teams.

The safety engineer has had several conferences and is now following up the proposal of holding the Northwest Mine Safety Conference in Wallace, Idaho, early in December.

At the annual meeting of the National Safety Council held in Boston, the inadequacy of mine-accident statistics was discussed and a committee was appointed to draft plans for the accumulation of more complete statistics. The Bureau of Mines agreed to compile these statistics, provided the National Safety Council members would furnish the basic information. The committee drafted a plan of procedure, which was adopted at the annual conference held last year in Detroit. The engineer assigned to this cooperation was therefore charged with explaining the statistical work to the different members of the council in order to gain their cooperation and get them to furnish the basic information needed. During the past year many of the mining members were informed of this constructive work done by the committee of the National Safety Council, and more than 170 mines are now furnishing detailed information on every lost-time accident.

(A unanimous vote of thanks was extended to Mr. Colburn and the Bureau of Mines.)

Mr. Tillson: Mr. Adams will not be here to report, and if he were, it would be somewhat early to make such a summary of his findings. He has written that he is getting complete reports. Eighty-three companies have reported, covering 278 mines, and from January 1 of this year, when the report started until I presume September 25, 4,333 lost-time accidents had been reported, including all that resulted in the loss of one day or more. During the month of October he hoped to be in a position to start tabulating this information that he had just completed, and he sent me a copy of a book of closely typewritten pages which was a codifying of all these causes and contributory facts in regard to accidents, nationality, time lost, nature of injury and cause of the accident in detail. It was a task for any man to place on the tabulating cards all the codifying symbols and to summarize all the items of information so I am not surprised that he has not been able to group and tabulate all the statistics and render a report. I am assured by him, however, that we may expect it before long.

SAFETY IN UNDERGROUND TRANSPORTATION IN METAL MINES

**BYRON D. SHOVE, SAFETY ENGINEER, OLIVER IRON MINING COMPANY,
IRONWOOD, MICH.**

In discussing the safety features in underground haulage in metal mines, I will confine myself to conditions as they exist in the mines of the Oliver Iron Mining Company, which is a subsidiary of the United States Steel Corporation, and particularly to the mines of the Gogebic District, located at Ironwood, Mich., with which I am most familiar.

We will start with the shaft or level station and follow through on a typical main level, taking in as we go the safety features necessary to safe haulage underground.

All shaft stations are equipped with pockets into which the rock and ore is dumped. From these pockets the material is drawn off into an auxiliary pocket which holds just enough material to fill the skip. These pockets are covered with grizzlies or guard rails, the distance between which must not exceed eight inches. These rails act as safeguards in making it impossible for anyone to fall into the shaft pockets. The shaft station is well lighted and all electric wires are in conduit. The trolley wire is guarded on both sides by an inverted trough guard made of wood. The sides of this guard are vertical and extend below the trolley wire not less than three inches and the space between the sides is not greater than six inches. This guard protects the men, when barring down the ore in the pockets with an iron bar, from coming in contact with the trolley wire. After motor cars are dumped, the doors on the cars are closed before leaving the shaft station to guard against flying out and striking against post of a level set and causing train to be wrecked.

UTMOST SAFETY PROVIDED IN DRIFTS AND CROSSCUTS

Just north of the shaft station and in direct line with the cage compartment is the timber station. The character of our ore is such that every foot of drift or crosscut, which is driven in ore, must be timbered and the set of timber properly lagged. Safe haulage can only be accomplished where the sides of the drifts and crosscuts on haulage levels are kept free of timber, plank, lagging, ladders, rails, etc. As it is necessary to keep on hand, underground, a sufficient supply of these materials to carry on daily work, it is certainly a safety precaution to have a storage place for them. With us, the timber station serves this purpose and by its use we are able to keep our haulage ways free of all materials.

Drifts and crosscuts are driven straight, even though in some cases it requires more rock work. We feel the advantages gained in doing this more than offsets the additional costs by increased safety and efficiency. They are well lighted and these lights are placed at different intervals depending upon conditions. Lights are also installed at all switches, cross-overs, chutes and refuges or safety zones. These safety zones are found throughout the haulage level and are spaced about 100 feet apart. They are timbered openings, cut in on the side of the drift

or crosscut, for a distance of three feet and afford a safe place in which to stand when motor train is passing. A green light is installed outside so that anyone seeking these safety zones would be able to locate one, in a hurry, should occasion demand. The trolley wire in front of each chute is guarded, in a similar manner, as at the shaft station. It is our practice to place all chutes on one side of the drift or crosscut and never stagger them. This makes it much safer for the motorman, as he knows, beforehand, the exact location of these chutes. He does not have to be dodging back and forth as he would if chutes were staggered. Care must be taken by men loading cars at the chutes, to see that no chunks or loose ore is permitted to accumulate on the track under the mouth of the chute. This prevents possible derailment of cars. Trolley wires throughout the level should be kept as nearly in alignment as possible. This lessens danger of trolley jumping. All track frogs, switches and guard rails should be properly and securely blocked so that a man walking over same could not get his foot caught. All throw-switches are of an approved type. The main safety features of these switches is the weight which is attached to the end of the throw handle. This keeps switch in an open or closed position.

Where a drift branches off a crosscut, the radius of the curve is thirty feet. This varies, naturally, on existing conditions but it is kept as close to this figure as possible. The outside rail on all curves is banked by raising the frog one and one half inches higher than the inside rail. This eliminates derailment of cars in going around curves. Where more than one electric locomotive is in use on the same level, block signals are installed. The main block signal is located in the shaft crosscut. As a locomotive goes out to the shaft, the trolley passes over a spring contact switch. This throws on red lights in the drifts and crosscuts from which other locomotives are pulling. When locomotive returns from the shaft, contact spring switch is automatically thrown by trolley again but in the opposite direction. This turns out red lights and throws on green lights, showing that block is clear.

ELIMINATE PERSONAL EQUATION BY AUTOMATIC WARNING

Timber is taken from the timber station on trucks. It is pushed by hand or pulled by locomotive into the timber raises. Here it is hoisted up into the subs by tugger hoists or dropped to the subs below. At the timber raises, space is provided for storage of small quantities of timber so that no timber is found in the main haulage ways. When locomotives are used in taking in loaded timber trucks to timber raises, we have a rule that trucks must be pulled, also that a long connecting bar shall be used between locomotive and truck. If a loaded truck was pushed by locomotive there is a possibility that the top part of piled timber would strike on the bottom side of the chute and push one or more pieces of timber back onto motorman. In years past, we have had serious accidents to motormen whose feet, hanging outside the locomotive pit,

were crushed between locomotive and cars or timber trucks. We have, therefore, made it imperative that motormen shall, when locomotive is in motion, keep feet inside locomotive pit.

No one is permitted to ride on cars and the motorman and brakeman are the only ones allowed to ride on locomotive. It is their duty to see that no materials are carried on locomotive. Automatic gongs of the gravity type are placed on all electric locomotives. The gong will sound at all times when locomotive is in motion. We feel that any such warning device should be automatic so as to remove the personal equation which is always present in hand-operated warning devices. Headlights are placed on both ends of the locomotive and are protected by meshed screen guards placed in front of open face. We use two types of trolley poles, namely, the pole and the diamond. When using the pole type, pole is so placed as to trail locomotive. If pole was placed ahead of locomotive there would be too much danger of trolley pole jumping wire, causing possible injury. Of the two types the diamond is preferable. This is due to its position remaining constant at all times. The position of the pole trolley must be changed periodically to conform with rule that pole must trail locomotive. The diamond type also affords better contact between the trolley and wire and motorman can at all times guide it, should it become necessary.

A red taillight is carried on the rear end of the train. We have tested out numerous kinds of taillights with varying results. The taillight we use is a railroad flagman's lantern, and is manufactured by Adams & Westlake Co., Chicago, Ill. It is very similar to a railroad switch-light but considerably smaller and lighter. It has two red bull's eyes which are in line with each other. The light is furnished by a lamp in which signal oil is burned. The taillight is attached to the end car by means of a handle which extend over the end about half the depth of the car and is set back under the gable bottom of the car. This last feature protects the taillight at all times and particularly when car is being loaded at chute.

The couplings on our cars are of the link and pin type. To prevent accidents, when coupling cars, we permit no one to do this work except the brakeman. He is instructed to lift the link into place, using the pin when making couplings. This puts this class of work in the hands of a man who understands and is familiar with it. When coupling cars on a curve, special care must be taken to do this coupling when standing on the outside of the curve. This side affords a greater distance between cars to be coupled than it would if brakeman stood on the inside of the curve.

SAFETY SUCCESS COMES ONLY THROUGH EDUCATION OF WORKMEN

In passing over switches, locomotive must be stopped before motorman or brakeman leaves the locomotive to throw switch. Under no condition are flying switches to be made. Another ruling, in regard to motorman, is that he shall not turn control handle and move locomotive while standing on ground. He must be on locomotive and his feet in

locomotive pit. At the end of the shift or, should motorman leave his locomotive for any length of time, he should remove the trolley from wire, put controller handle in an "off" position and place reverse lever in neutral.

When blasting is being done in the subs, close to a chute, there is always a possibility of some of the powder falling down into the chute. Trammers or any other men working on the level at or near this raise should be notified and all traffic stopped at this point until blasting has been completed.

Our haulage equipment consists of the following: 25 pound rails are used on all main levels and tracks have a 24 inch gauge. Electric locomotives are of two types—four and five tons. The four ton is manufactured by The General Electric Company and The Westinghouse Co., the five ton by The Goodman Manufacturing Company. Our main level cars are 24 inch gauge, iron, side dump, gable bottom, equipped with Hyatt roller bearings with spring lever dumping arrangement on end and have a capacity of two tons. The axles are 2½ inches, cold-rolled polished steel, equipped with 16 inch semi-steel wheels, one of which is pressed onto axle, the other being loose. This loose wheel takes up the slippage when car is going around a curve. The couplings are of cast steel and the links and pins are made of wrought iron.

Haulage accidents can be avoided only by the strict enforcement of all safety rules and regulations. Daily inspections should be made of all rolling stock and a rigid educational campaign should be carried on among the men engaged in this class of work. For after all has been said and done, education is really the keynote of accident prevention. Someone has so truly said: "The greatest safety device known is a careful workman."

DISCUSSION

Asked by Mr. John R. Brownell, Mr. Shove said that parallel-throw switches were not used but that plenty of space for operation was provided. In the reply to the same question, Mr. Shove said that the trolley wires were not protected throughout the level but only at the chutes and so as to extend on each side 3½ feet beyond the end of the bumpers of a two-ton car. The car was, of course, spotted immediately opposite the chute and consequently any man working at that point was fully protected.

The ore is a soft hematite with much moisture. For this reason it does not always run as readily as desired. Much poking has to be done, and the trough used to be arranged so that the bottom edges were further apart than the top edges, but, unfortunately, when it was so built a man could put his shoulder up in the trough. Now, the boards are placed parallel and enough space (six inches) is left to give the trolley wheel room to pass through but not enough that a man can get his shoulder between the boards.

Mr. W. F. Pellenz, Jr., said that the Oliver Iron Mining Company, at Eveleth, Minn., was using an electric tail light on locomotive ore trains which gave satisfaction, and that in the mines of his district a caboose was put on timber trains as it had been found that on a return trip the empty timber trucks were apt not to be visible. Men who have stepped out for the locomotive to pass are apt to step back into the timber train. To avoid that a caboose is used equipped with the ordinary switch lamp, burning carbide.

On the chairman asking whether electric couplings were provided between the cars Mr. Pellenz said that they had been used but, though it was the aim to keep the cars of the timber train intact, they were often switched and separated from the train. The chairman said that years ago the New Jersey Zinc Company had attempted to operate and equip all its cars in that way, but trouble was experienced in maintaining a good circuit with any kind of coupling it could devise at that time. Mr. Pellenz stated that the couplings required no more attention than equipment of this kind should receive.

USE OF CABOOSE

Mr. R. H. Seip wanted to know if anyone was using a caboose for his trainmen between the locomotive and the trip, not on the timber trip but on ore or coal trains. The chairman said that owing to a single accident the New Jersey Zinc Company had established the use of the caboose. A man who was riding on a locomotive was knocked off by a chute, crushed between the cars and killed. That one accident occurred after many years of immunity from that cause of accident, but that one unfavorable experience caused the company to build a small coupling car on which three men could ride and disembark from without danger. It is not provided with a cab. No one present declared that they were using any such safety equipment.

On Mr. A. H. Trestrail asking if any one was using automatic couplers, Mr. Shove said the Oliver Iron Mining Company was not using them in the Ironwood district, in fact they were possibly the only company that was not using them, though he believed they were "the only thing." The chairman then said that the New Jersey Zinc Company had equipped the last 20 or 30 cars purchased with automatic couplers of junior size but had so far had little experience with them. Some people regarded them as a nuisance because they could not be coupled on curves without shifting the coupler bars but that had to be done in every case with the link-and-pin couplers.

Mr. Joseph W. Reed asked what was the depth of the junior coupling. How much would it be necessary to raise one bar above another to cause them to uncouple or was the coupler arranged on a different principle from that of the Gould coupler on railroad cars? The chairman replied that he did not see how it could uncouple. The two knuckle joints lock in each other and the pin drops down and holds the couplings in place. It is a pin coupling inside a knuckle joint.

Mr. Reed responded by saying that he knew of a small car in a coal mine that had been equipped with a coupling 4 inches deep. The track was not in good condition, and it was found that the cars uncoupled at every low joint. Finally the blacksmith made a coupling of small chains and the use of the automatic couplers was discontinued.

Either the track was greatly at fault or the coupler was deficient in depth. Mr. Reed added that a coupler 10 inches deep had been used on a large mine car and given no trouble whatsoever. Mr. E. W. Haggerson said that the Youngstown Sheet and Tube Company had used automatic couplers, but they would slip out in passing over a slight change in grade. The management had them all taken to the blacksmith shop. There shoulders were added at the top and bottom, and as a result they now never come apart.

Mr. A. H. Trestrail asked whether it was not an objection to the automatic coupler that on a curve the man who was coupling the cars had to reach in and line up the connection either with his hands or his feet, but the chairman declared that the same difficulty presented itself with the link-and-pin coupling. Mr. Trestrail wanted to know whether an arrangement could be made on the outside of the car so that the man doing the coupling could avoid the necessity of reaching between the cars.

Mr. Haggerson said that the Youngstown Sheet and Tube Company used acetylene tail lights made in their own blacksmith shop and found them quite satisfactory.

The chairman added that the New Jersey Zinc Company had used acetylene lamps but were troubled by the breakage of the red lenses. Mr. Haggerson's experience was similar. In two or three months 254 lenses were broken. At last they found a non-breakable lens. The lens would break, but the parts would not separate.

SAFETY IN MINE LOCOMOTIVE HAULAGE

G. F. MACWILLIAMS, ELECTRICAL ENGINEER, PENNSYLVANIA COAL AND COKE CORPORATION, CRESSON, PENN.

The quantity of coal to be hauled, the distance the loads have to be transported, the grades to be traversed, and the weight of the empty car all combine to govern the weight of the locomotive or the size of the hoist that must be used in mine haulage.

As, on a gradient of 7 per cent, a locomotive or loaded car will slide if once started downward, hoists should be used instead of locomotives on gradients of 7 per cent or over wherever possible. This commends itself as a policy, for as a locomotive must haul itself as well as its trip it becomes extremely inefficient on such gradients.

As a trip will run readily on a $2\frac{1}{2}$ per cent gradient, and will run backward if a coupling should break, drags should always be provided where the gradients are $2\frac{1}{2}$ per cent and over.

Even if no one is injured, the wrecking of a single trip will prove far more expensive than providing a drag. Thus economy as well as safety will be promoted by its use.

As heavy rails give conditions favorable to traction and also support the load more safely and keep the track in better shape and for a longer time, they should be used in preference to light rails.

LOCOMOTIVES

The wheel base and the diameter of the wheels of a locomotive should be proportioned to the radius of the curves the locomotive is to run over, to the speed of the locomotive, and other factors. For instance, with a curve of eight-foot radius, the wheel base should be $20\frac{1}{2}$ inches, and the diameter of the wheel should be 18 inches. Similarly with a curve of 4 feet, 7 inch radius, the wheel base should be 10 feet and the diameter of the wheels 33 inches.

No less a tread than 3 inches should be used on a gathering locomotive running on 16- or 20-pound rails, as the track cannot be kept in gage unless the tread is at least that specified. With a haulage locomotive, however, a $2\frac{3}{4}$ -inch tread will suffice if the tracks are kept in proper condition.

The minimum clearance of the lowest part of the locomotive from the cross rails should be $3\frac{1}{2}$ inches, this allowance being increased to 5 inches at the bumpers.

The weight on the driver of a locomotive should be carefully balanced. Otherwise the locomotive will tend to climb the rails on curves, the drivers may slip, pinions and gears may be stripped, the brakes may fail to hold and the motors may burn out.

It would appear that the practice of connecting sets of drivers by sprockets and chain so as to balance the load could be carried with beneficial results much further than is customary. The braking effect on a steel wheel is greater and its tendency to slide backward is less on steep grades than with the cast-iron wheel. For this reason it is a safer wheel to operate, but changes from cast-iron to steel wheels should not be made without considering the effect on drawbar pull, as the motors are liable to be overloaded by the greater tractive effort after the change is made unless the speed is reduced in some manner.

The cast-iron wheel is cheaper and will wear less when first installed than the steel or steel-tired wheel, but as soon as the "chill" is worn through it must be scrapped. Due to the hardness of the tread of the chilled cast-iron wheel its adhesion to the rail is less than that of steel wheels. This reduces the drawbar pull as well as the power of the brakes. The steel wheel, whether rolled or cast, or the steel-tired wheel will give 25 per cent more tractive effort than the cast-iron wheel and, if properly designed, can be turned successfully several times, thereby offsetting the lower first cost of a wheel made of cast iron.

The most dependable form of brake is one that acts directly on the wheels, for brakes acting on the armature or intermediate shafts may be put out of service by the fracture of a shaft or the stripping of a pinion. For this reason regenerative or magnetic braking with the motor should be regarded as merely auxiliary. When such braking is provided

the hand brake which applies pressure directly to the wheels by no means should be neglected. The brakes should be arranged so that the pressure against all the wheels will be equalized, for by that means the maximum braking effect will be attained.

MOTORS

In order to prevent overloading, which may cause the trip to get out of control when descending grades, and because of the high cost of maintenance when the motors are overloaded, they should be of such capacity that they can cause the wheels to slip.

One side of the motor should be suspended on springs to prevent shock to gears, pinions, axles and armature shafts. Many cases of high cost of maintenance may be traced to the condition of these springs or their elimination.

The axle linings and the housings of bearings should be carefully inspected for wear, for many armatures as well as many gears and pinions are destroyed from the lack of adjustment of either or both, which throws the gears out of mesh.

BUMPERS

The writer prefers as a bumper, a steel channel with wood blocks, having two inverted ells near the center, for in a collision the wood acts as a cushion, the ells preventing the locomotive from being overridden by the cars. When the bumper is thus constructed the steel channel will bend or spring whereas if the bumper is a casting it may be broken in two.

CARE OF WHEELS

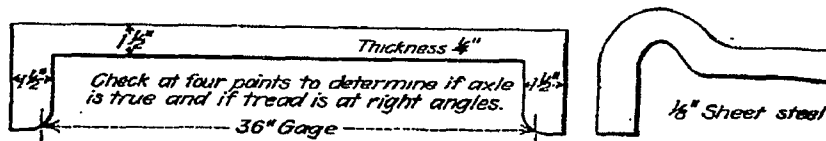
Wheels should be kept in condition, or the locomotive will be derailed. Many methods have been tried for overcoming the effects of wear, and the best means for maintaining safe wheels is a consideration closely allied to their safe operation.

Steel tires, if shrunk on, will prove expensive to maintain unless a good mechanic is on hand to see that the tire is shrunk on the wheel in the correct manner. A tire that can be removed and installed like an automobile tire has been used with success by our company. We have a dummy center on which it can be installed readily for turning whenever the tire becomes worn. We tried for some time to true the wheels by grinding, but the cost was high, and the mechanics made much objection to the dust raised during the truing operation. Furthermore, it is difficult to keep the wheels true by this method.

We have reduced the number of shapes and sizes of wheels on our locomotives to comply with certain standards and have so arranged them that in many cases after a wheel has been turned down a number of times it can be used on a locomotive taking a wheel of smaller diameter. Whenever a wheel has worn on the tread so as to give a false flange $\frac{1}{4}$ inch deep it is sent to the shop for turning.

been damaged in shipping. We have made no attempt to build up by welding the whole tread of a worn or damaged wheel, for fear that doing so would warp the wheel or set up heat strains. However, flat spots in the tread, not over 2 inches in length, are sometimes restored by welding, the wheel being turned true after this operation.

WHEEL AND TIRE GAGES USED BY MR. MACWILLIAMS



The Pennsylvania Coal and Coke Corporation is confident that by keeping the axle true and the tread at right angles derailments can be avoided.

We have not been successful in using self-grinding brake shoes, as every locomotive wheel would need a shoe suited to the deformity produced by wear, and the wheel would have to be carefully watched. The shoe would have to be removed when it has done its work or it would wear down the tread excessively.

All the wheels should be turned at the same time, for if one pair has a thin flange and the other is new the locomotive will not ride parallel to the track, and derailments are likely to occur. Consequently, when new wheels are installed a complete new set should be provided.

I believe it is safe to state that 20 per cent of the series fields in locomotives that have been operated over three years are defective, and it is good practice to test the fields whenever an armature is changed because it may burn out from overloads. Of course, an armature running in a defective field will tend to rotate faster and if in parallel with another motor will carry an excessive load. It is for this reason, principally, that I believe it to be bad practice to provide only one circuit breaker or one fuse for a locomotive. Contrary to the general practice, each individual motor should have its own protection.

If a thorough inspection were made of all locomotives, it would be found that in many of them the wire is too small. In consequence, time is lost on the road, material is destroyed, and the operative exposed to danger unnecessarily. These defects could be avoided were more consideration given to the size of the wire and its proper installation.

TROLLEY WIRE

In most cases 4/0 trolley wire is as small as should be used, and in some cases we are about to try 6/0 wire so as to obtain more power and give the trolley wheel a better contact. In few roadways should the hangers be placed over 25 feet apart, and in many places they should be set even closer, as the price of a hanger and the cost of its installation is easily lost in the damage to pole heads, wheels, poles, etc. Furthermore, when the wheel strikes the roof the operative is in danger.

Seldom are enough hangers installed on curves, and the trouble resulting from the incorrect alignment of the wire is so frequent that the motorman regards it as a condition altogether to be anticipated. The feed to the trolley wire from the feeder is generally mechanical and of insufficient capacity. Soldered feed ears with soldered lugs instead of set screws and a soldered tap to the feeder would give better results.

It is remarkable to me that no one wishes to try out in the mines the Edison three-wire system, using the rail as a neutral. If the locomotive is in perfect condition, but the track or feeder system is in poor condition, safety and economy are still lacking.

In many instances it will be found that a feeder having a cross section of as much as a million circular mills has been installed, with 2/0 or 4/0 bonds on the rail and no return conductor. If the rail is of ample capacity it is more economical to bond the rail to its capacity than to go to the expense of a return conductor, as the labor cost of installing the small bond will be nearly as great as that of using the larger, and the material cost of the large bond will be much less than the cost of the small bond and the return conductor. The writer prefers the welded bond, for while the first results of the compressed type of bond are as good as those of the welded type, the welded bond unquestionably lasts longer.

Wherever possible, feed ears should be of the soldered type, for after a clamp feed ear has been in service for a year its value is doubtful. To give the necessary strength the suspension ear should be long and thin rather than short and thick, so that the trolley wheel may pass over it smoothly and without vicious sparking. With an adequate feeder or return system, the locomotives will work inefficiently, the cost of maintenance will be high, and as the headlights will fluctuate, an irregular illumination of the track will make the haulage service dangerous. Furthermore, with bad trolley wire and hangers the vicious sparking that will inevitably occur will blind the operative and distract his attention.

For main haulage hardly anything will compete with the trolley locomotive. If the excessive ventilation required by a gasoline locomotive can be provided without undue cost, that form of traction can be used, but where such ventilation is difficult or costly the gasoline locomotive cannot compete with the electric.

For gathering, the storage-battery locomotive is probably the safest, but it has the disadvantage that during the day's work it is constantly losing power. The cable-reel locomotive is probably the type most liable to cause accidents, for at the room neck the operative must make connections either with the trolley wire or with both the trolley wire and the rail. The dragging cable also needs care if accidents are to be avoided. We have found the combination locomotive economical, as the battery has to handle only one or two cars in a room and the time lost in connecting the cable is avoided. The combination locomotive is safer than the cable-reel type because the danger of coupling the cable is ob-

viated. We get more coal per locomotive with the combination gathering locomotive than with either of the other types, the straight battery machine gathering least coal of any.

All our cable reels are grounded through the frame of the locomotive, and when using concentric cable some of the dangers may be avoided by making the outside copper always of negative or of ground polarity.

RESTRICTED USE OF SAND

The less sand used, the safer and more economical the operation is. The ideal quantity of sand to use would be such as would give the rail a coating as thin as that placed on sand paper. A handful of sand will offer as much resistance as a two per cent adverse grade, and a large quantity will obstruct the trip after the locomotive has passed. It will also tend to reduce the power received by the locomotive and is liable to insulate it from the rail, making it dangerous for persons to touch it. On a man trip if an insulated coupling is not used the current passing through the couplings may shock the men in the cars.

Too little attention is paid to fuses on all mine machinery; copper wire, pieces of iron, etc., often replacing fuses. Circuit breakers are jumped or blocked with the result that the equipment is overheated, insulation is roasted and in consequence in case of short circuits or other troubles neither machine nor operative have any protection.

MINE CARS

All kinds of mine cars are used, yet, as far as I can learn, little consideration has been given to reducing the friction in plain bearings by properly proportioning them to the speed of the wheels, except possibly in the case of the hollow axle.

Most couplings are of primitive type and a source of danger. The car in general is seldom designed so that it will haul the largest quantity of coal with the least dead weight possible having regard to the kind of mine in which it is to be used.

We have had at our mines only one minor accident due to locomotives in three years and only three minor accidents due to electricity in that same period. In the past we had many derailments some of which were due to the springing of axles in the unloading of wheels. Since we have put our rules in force we have had no locomotive derailments for a whole year.

DISCUSSION

Mr. M. S. Murray said that the experience of the Ford Collieries Company with welded bonds had not been fortunate. His company had been using the type where the bond is welded to the ball of the rail. Mr. MacWilliams said that he had taken up with the American Brass Company the question as to the proper shape for a bond and the proper place for its application. He had induced the American Steel and Wire Company to develop a triangle shape which is put on the top or base of the rail. It bridges the fish plate beyond the joint.

He tried welding on the ball of the rail and under the base of the rail but in both places had trouble. Mr. MacWilliams assured Mr. Murray that the bond finally adopted was a flexible bond. He said that he had discovered—what apparently hitherto had been given no consideration—that the area of the weld must be ten times the cross-section of the bond itself. The type of the bond which the American Steel and Wire Company devised for the company is called the A-C type. Some of the bonds have been installed already for one year. The bond is of a flexible copper cable. The head is welded on in the factory.

Mr. MacWilliams said the demountable tire was manufactured by the General Electric Company, and that in one place where they were being used, the trips were being hauled a mile over a $4\frac{1}{2}$ per cent gradient, much sand being used. He watched the demountable tire carefully to see if the heating would cause the tire to expand and loosen. He found that it did not.

Mr. Tillson then called Mr. MacWilliams' attention to that part of his paper in which he advocated "the practice of connecting sets of drivers by sprockets and chain so as to balance the load could be carried with beneficial results much further than is customary." He desired to know whether he applied that suggestion only to locomotives that have only a single-motor drive or intended it to apply to those which have a motor drive on front and rear axles. Did he, said Mr. Tillson, believe that these should be interconnected?

Mr. MacWilliams replied that in every instance it was advisable to connect the axles with sprockets and chains and added that, without such a provision, he was convinced that the effort on the two axles was not adequately equalized. Asked by Mr. Tillson whether in the dirt of the mine it would not be well to limit the use of sprockets and chains and whether the benefits of equalization would not be lost in the disadvantages resulting from the use of this additional mud-gathering complication.

Mr. MacWilliams replied that he had had a 14-inch sprocket and chain in use four years and that sprockets and chains had been used both with single- and double-reduction gearing. The sprocket was applied to the main axle of the locomotive, the sprocket and chain being at one end and the gear of the motor at the other.

HIGH SPEED STORAGE BATTERY LOCOMOTIVE

Mr. Tillson said that the New Jersey Zinc Company was trying a high speed two-and-half ton storage-battery locomotive with a remote-control system so that the usual crew of three men (two men to load the cars from the chutes and dump the ore and a third man to spend most of his time in the locomotive spotting the cars) could be reduced to two by mounting on the locomotive a spring-retracting cable reel. By hanging a relay three-wire cable wound on the reel to a nail near the chute, the chute loader standing near the rail and operating the bars can control the locomotive moving it back and forward on the slow-speed position.

This device is to be used in intermediate levels where the hauling distances run about five or six hundred feet and where small cars and hand tramping are now generally used because of the restricted sizes of the drifts and the sharp turns in the timberage. The equipment, said Mr. Tillson, has, as yet, not been received and so it is impossible to say how successful it will be in actual practice.

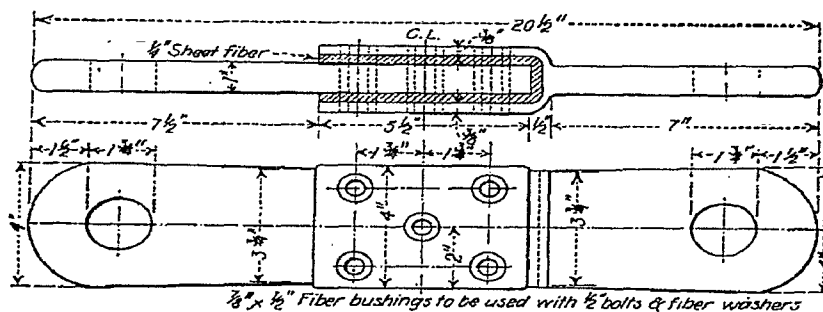
In response to Mr. Hall's inquiry, Mr. MacWilliams stated that the Pennsylvania Coal & Coke Corporation, that had such a remarkably low record for accidents due to electricity and derailments and had not had a locomotive derailment for a year had thirty-six mines and 205 locomotives. In one mine the haul was over five miles and in that mine the average haul was 3.8 miles. The tonnage of all the mines is between 15,000 and 18,000 tons daily.

All the coal is hauled by locomotives and hoists. On some extremely bad grades hoists are being used and the Pennsylvania Coal & Coke Corporation found them very economical and safer than the locomotive. The company also has small 5-hp. hoists with which cars are gathered to the room heading.

In reply to Mr. L. C. Isley, Mr. MacWilliams said that insulated couplers, made in the company shops, were used on all man trips, the coupler being built up of flat iron and hard fiber. Mr. M. S. Murray said that the Ford Collieries Company, was using insulated couplings on many trips similar to those described by Mr. MacWilliams, except that wood was used instead of fiber. He added that the wood in time would draw moisture making the coupling leak, and then the wood blocks had to be renewed which was not difficult or expensive matter. Mr. MacWilliams stated that the fiber was more expensive than wood but that the couplings lasted a long time when manufactured according to the designs which the Pennsylvania Coal & Coke Corporation was using.

In reply to Mr. Tillson, Mr. Murray said that they did not paraffin the wood used in their couplings. Mr. Tillson said that if the wood were soaked in melted paraffin, it would materially increase its electric re-

INSULATED DRAWBAR COUPLING



This coupling is used at the mines of the Pennsylvania Coal & Coke Corporation for preventing current from running back from the locomotive to the mine cars. Fiber serves as the insulating medium.

sistance. It was common practice to use paraffined wood on rails to insulate locomotives. Mr. MacWilliams advocated the use of fiber as wood split too readily and fiber would last.

USE OF BAKELITE

Mr. Tillson desired to know if any one had used Bakelite. He said, he had found that insulating material inefficient on an underground mining signal. Though it is used on automobile magnetos it is not a good insulator when moisture gets on the surface for, being a carbonaceous material, it carbonizes and gives unsatisfactory results underground.

Mr. MacWilliams said, that the National Electric Light Association thought well of the form of protection used at his mines. The steel coupling is protected by a coating made of boiled linseed oil, red lead and jajan. On the fiber was used a baking varnish, well baked in. Mr. Tillson said that porcelain, if used, would not stand the shock. In this Mr. MacWilliams concurred.

Mr. A. C. Germain said that he noted that at both Mr. Shove's mines and those of Mr. MacWilliams link-and-pin couplings were used. With these, men frequently had their fingers smashed or amputated. He said that the company with which he was formerly associated had standardized on a certain maximum curvature and had requested the National Malleable Castings Company to provide a coupling that would meet his company's conditions. That firm recommended a three-quarter size Vulcan Standard Coupler, and this was installed. After that no accidents occurred during the year and a half in which the couplings were under his observation.

Mr. Germain said that he did not know how the particular car, which was small, compared with a mine car as he was not a mining man. Asked how the couplings compared with Master Car Builders' coupler, Mr. Germain said he believed it was of the same type. Mr. MacWilliams said his company would be glad to discover a patent coupler that would go satisfactorily over the sharp vertical curves over which the trips had to pass. In hoisting on to the tipples the cars had to travel over sharp knuckles and he had not been able to find one that would pass over those knuckles satisfactorily.

SAFETY IN UNDERGROUND TRANSPORTATION AT COAL MINES—TRACKS

ALPHONSE F. BROSKY, ASSOCIATE EDITOR, COAL AGE, PITTSBURGH, PA.

Haulage is that phase of mining over which the operator has the greatest control. He is not so well able to protect his men against falls of roof and coal as he is against accidents from locomotives and mine cars. It may also be pointed out that, as in many other instances, safety in mine haulage is good engineering practice, not only humanitarian but profitable to any operator or engineer who provides it. Wrecks are as wasteful of time and equipment as they are of human lives.

President Rush N. Hosler told the Coal Mining Institute of America that in Pennsylvania bituminous mines "one employee in every 250 engaged in haulage is killed each year, and annually one brakeman and trip rider in every 120 engaged in that work is killed." An analysis of his tables giving the causes of fatalities from accidents in the haulage of bituminous coal discloses that 28 per cent of these accidents occurring during the last five years on the outside of the mine and 41 per cent on the inside are due to wrecks.

CORRECT HAULAGE METHODS REDUCE ACCIDENTS

In most cases wrecks are not the direct fault of the employees. Faulty rolling stock and trackage are responsible. More attention to clearances, more effort to keep the haulage roads clean, more provisions to prevent derailed cars from displacing timbers, the employment of trap doors that operate automatically and a due regard for discipline will ultimately reduce these percentages to a normal level. Proper attention to the safe practices in haulage will afford steadier work to all employed, and this results in greater efficiency.

Underground transportation can be bettered in two directions—one, attention to the road bed and the other a study of the more technical features of the problem.

For safe and economic haulage the track should be well supported and straight to a fault except where curves are necessary to meet changes in direction. Such curves should be of long radius. On the main haulages the curves will be so gradual that the motorman will feel assured of safety and so will not cut off any of his power and the only reduction in speed will be that which is the result of the increased friction between wheels and rails and between axles and bearings such as is inevitable when traveling around curves.

If he is not compelled to "feel" his way around the curve, then assuredly that curve is properly designed and constructed. The rails should be so well matched that the joints have neither vertical nor horizontal offsets of any magnitude. Then the locomotive and cars will travel quietly except for the inevitable noise of moving parts and rubbing surfaces. The cars will not sway from side to side as the wheels hit irregularly lined joints, nor will the wheels be mounting or dropping at stepped joints. To insure this regularity of track, the rails must be tied together by fishplates firmly bolted and be mounted on ties spaced close enough and ballasted well enough to carry the loads to which they are subjected.

Judgment and not a rule of thumb should be used in selecting the kind and size of ties and in deciding upon their spacing. Sometimes when the spacing seems to be correct the support may be insufficient, due to the condition of the timber. Ties to all appearances sound may be rotted on the bottom, in which case the track is likely to spread or break down at an inopportune moment, fail without warning and cause a serious wreck. There is ample proof, from those who have already tried out the plan, that wherever track is to be kept in permanent use, treatment of the ties with wood preservative is both an economy and a

safeguard. The rails should rest on tie plates, especially where the ties have been treated with a wood preservative and so are likely to have a life long enough to make it profitable to preserve the timber from the tearing action of the spikes. And here let it be said that only the best ties obtainable should be used. Culls have no place where strong track is desired.

The Inland Collieries Company recently adopted as standard practice the laying of creosoted ties on all the main haulage roads in its Indianola mine, located near Pittsburgh, Pa. Whenever old, untreated ties are replaced on these roads, creosoted ties will be used for the purpose and their life will be lengthened by inserting tie plates between rail and tie. An example of this practice is well illustrated on a west haulage road off the main north entry in this mine. A stretch of 2,500 ft. is laid with 60-lb. iron, resting on 5x7 in. creosoted yellow pine ties spaced on 19-inch centers. In providing a suitable grade for this track much rock was penetrated. This refuse was utilized in ballasting the track. Though the cost of the treated ties was about \$1.10 each, the ultimate saving warrants the expenditure.

No fixed rule has been adopted for the spacing of ties on underground roads. Too often they are set too far apart, with resultant track trouble due to insufficient support. The track gets out of line simply because the ties are too few to keep a sufficient grip on the roadbed and spreading is likely to occur if by reason of the sparsity of ties a sufficient number of spikes cannot be driven to hold the rails to gauge. It is better always to err in the direction of placing ties too close to each other than to attempt to economize by putting them too far apart.

If the tracklayers are careless and do not leave enough clearance at the joints before plating and spiking, the rail is likely to buckle. If old track sags and gets out of alignment, it may be realigned, the joints may be made tight, ties retamped and conditions greatly improved thereby without interfering with current operations; but if it buckles, no matter to what extent, there is but one positive remedy and that is to tear up the entire length affected, to jack the crooked rails until they are straight, to shift the ties back into line and to re-lay the track.

The Elkhorn division of the Consolidation Coal Company maintains a uniform joint clearance of $\frac{1}{2}$ inch in all its mines. A gauge of poplar $\frac{1}{2}$ inch thick is furnished all tracklayers for this purpose.

HEAVIER RAILS FOR UNDERGROUND TRACK

The growing tendency in mines is towards heavier rail on main haulageways. Rails heavy enough to sustain almost rigidly the loads which travel over them should be provided. With the introduction of the electric mine locomotive 40-pound rail was laid on all major haulage roads so that today only rarely is a mine with a production of 1,000 or more tons daily equipped with lighter rail than this. Where companies produce a large tonnage from a single mine they sometimes provide rail even heavier than 40 pounds for their main haulage roads. Not a few companies have been using 70-pound rails for some time wherever long hauls

form the face to the shaft bottom or to daylight necessitates the maximum speed allowed by law. With the rapid advances in underground transportation, may we not believe that at some future date all mines with large acreages will be laid with 70-pound track, and the whole system laid out so as to approach that on our present railroad systems?

To maintain good track after it is once laid, the entries, wherever water is likely to gather during the wet seasons, must be provided with drainage ditches. In many mines where the roadbed softens and expands when wetted, the management need look no further than this for a cure of its haulage ills. Ordinarily, in a well-drained roadway the waste material of which the roadbed is made tamps to a compact mass that gives but little under a passing trip of loads. But when wetted this same material loosens up and heaves, distorting the track and failing to support it properly.

BRACING TO ELIMINATE TRACK SHIFTING

Track shifting can be averted, oftentimes, merely by bracing the rail from the ribs. The number of braces in a unit of distance depends upon the tendency of the track to shift. Two braces to one rail length, staggered to either side, usually is sufficient. One company, on main haulage roads, staggers these braces so that they are placed on 29-foot centers. However, on curves these braces should be inserted every 8 or 10 feet. It is a wise practice to brace every curve on which locomotives and trips are likely to pass. In any case, the braces and ties should not be permitted to project above the level of the roadbed or above the walkway on the clearance side.

In the Springdale mine of the Allegheny-Pittsburgh Coal Company, the South river tunnel crosses under the Allegheny River. Due to the character of the bottom, which is fire clay, and to the wetness of the tunnel, the management found it next to impossible to maintain a well-aligned track there until a roadbed of concrete was constructed. The track was blocked up, section by section, to permit pouring of concrete slabs to grade. These were constructed with a thickness of about 12 inches. When they had set, each section was lowered on the table-like roadbed whose large bearing surface now supports the track so well that no further trouble from this source is being experienced.

In passing, I wish to emphasize the need for care in installing and maintaining rails and switching equipment. Near frogs, guard rails should be used just as frequently in the mine as in standard railroad work. Caution should be exercised in the laying of switches to place the knuckle of the rail and the switch point in proper relation to each other. Carelessness in the laying of a turnout frequently is manifested by the "bunching" of the curve of the turnout near the frog. Rolling stock in passing over the resulting "hook" changes direction abruptly, as a consequence of which, the wheels sometimes are lifted from the track.

Certain changes must be made in trackage from time to time to meet shiftings of the live working places. Switches and frogs to a room neck, even though that room will one day become a haulage road, should

be torn up as soon as the room is finished, if this equipment will not be used again for a period of six months or more. It might be advisable to lay better track at this point later. Frogs and switches are destructive to rolling stock and the fewer there are the better.

CAUSES OF LOCOMOTIVE DERAILMENT

There is ever existing danger of locomotives being derailed whenever their tires are worn down to an extent that the clearance between the underside of the locomotive and the rails is no longer sufficient to pass over without rubbing obstructions between the rails. A piece of slate or a hard piece of coal on the roadway may raise the locomotive from the track and cause it to leave the rails. This is more likely to occur where the track rolls, for in that event the front end of the locomotive tilts upward or downward as it travels along the roadway. By better locomotive design the dangers of derailment arising from the faults of the machine itself are being eliminated. In consequence practically all new locomotives are safe in this respect. In the past, a few locomotives were designed without enough underclearance to permit the machine to run safely even when the wear on the tires still was within reason.

Inquiry was made of mechanical engineers at mines as to the wear on a locomotive tire which might be considered reasonable, economical and safe. The reports received from many of those consulted indicated that they were practically unanimous in the belief that a locomotive never should be allowed to lower more than one inch by the wearing of the wheels—that is, the web radius should be reduced no more than that. Practice from mine to mine differs but little in this regard. Tires are permitted to wear $\frac{1}{2}$ inch, more or less, before the first turning. Then they are worn $\frac{1}{2}$ inch more, thus lowering the locomotive one inch. Occasionally it is the practice to allow the tires to wear down still more, in which event they should be turned twice. The practice is neither economical nor safe, however.

On well-kept haulage roads where no obstructions project above the level of the rails, a well-designed locomotive is in little danger of rubbing along the bottom, even though the tires be allowed to wear thin. In spite of the fact that the motors on locomotives are hung low and tires wear or are turned until they are thin, reducing the underclearance as much as $1\frac{1}{2}$ inch, this should not cause the locomotive to rub on the bottom, provided the roadway is clean. It is not safe to lay too much stress on the cleaning of the roadway, however, for a fall of rock or coal from a car or from the roof may make the roadway, however well kept, far from clean at the point where it occurs.

Locomotive clearance always must be figured from the elevation of the top of the rail and not from its base. The locomotive may pass readily above the ties and yet come to grief at the transverse rail of a turnout.

Deeply grooved locomotive tires are likely to cause accidents not on the straight track but in transferring at switch points and to a lesser extent in crossing over points of narrow-angled or large-numbered frogs

rib. Where the roof load is no greater than may be carried safely by the coal itself, short blocks resting on the coal may be used to support the crosspieces. This will keep the footing above the danger zone which lies between the bottom of the roadway and a point slightly above the top of the mine car.

Steel timber sets find their greatest use at turnouts, and it is just here that a derailment is likely to occur. Anchoring the legs on concrete piers placed in the bottom will not always prevent these posts from being dislodged when hit by a derailed motor. The safest practice is to build a concrete wall approximately the height of the mine car and to rest short legs on this.

When a long trip of cars, either of loads or empties, travels along the roadway, the motorman being on one end and the snapper on the other, a mine car in the middle of the trip may leave the track and ride the ties without either man becoming aware of that fact. Sometimes the motorman can feel by the jerking of his locomotive that a car in the trip is derailed, but this is rare.

FOUR PERMANENT RERAILERS UNDERGROUND



These rerailers replace cars automatically as the trip proceeds on its way. The illustration is from a photograph taken at Mine No. 294 of the Consolidation Coal Co., Jenkins, Ky. The rerailers retrack cars both on coming and going trips. Note the wood inclines which raise the wheels gradually to a height at which their flanges or their treads can move readily over or onto the rail, respectively, and drop into place.

He may ascribe the "hard" running to a lack of lubrication or to some other condition and remain content until a pile-up occurs. A derailed car often will continue to run in this manner for long distances, being held from further displacement by the cars on either side of it. Several cars may leave the track before the motorman discovers that something is wrong.

USE OF RE-RAILERS PREVENTS TRAIN ACCIDENTS

Nowadays, permanent re-railers are being introduced at points in the mine where cars are most likely to leave the track unnoticed. These form an integral part of the track itself. Sometimes they are placed on the outside of the track and sometimes on the inside. Occasionally they are placed on both sides. They automatically rerail mine cars and are equally effective in guiding the wheels of a locomotive back to the track, using its own power for that purpose.

When these rerailing devices are used an elevating platform is placed between the wing flanges and the straight track. This usually is of wood and is arranged so as to rise to the rail level at the point where the rerail and the other rail come most closely together. This is known as the "throat". In this way the wheels will be at an elevation that will make rerailing easy and automatic.

Though derailments occur where conditions are such as to favor them they are likely to happen even where they are least expected. Motormen insist now that their locomotives, regardless of type, shall carry rerailers. Efficient companies are equally insistent on this score, maintaining that time should be saved that is wasted in looking for the paraphernalia wherewith to retrack derailed locomotives.

The use of props, ties or a jack in this work is to be discouraged if possible as that practice is fraught with danger to life and limb. No man is a coward nor is he lacking in devotion to duty when he refuses to hold a tie or prop in position for the rerailing of a locomotive. Unusual conditions surrounding the scene of derailment may make it impossible for a locomotive to regain the track on its own power. Another locomotive, a block and chain or a Sylat post puller will aid, the last two by holding what ground is gained by the locomotive in moving under its own power. Extreme care should be taken by the men to keep out of the direct path of the chain for the latter is sure to act like a whip whenever it breaks.

PROPER INSTALLATION AND MAINTENANCE IMPORTANT

Some one method of laying track should be adopted. The tracklayers will readily adjust themselves to it. Coal companies do not insist with sufficient determination on the proper installation and maintenance of their track equipment. This is just as important as good materials for complaints against the material in use often lies not so much in faulty fabrication as in improper installation and maintenance.

Track should not be laid with rails of too many different weights. The usual three classes—heavy for the main roadway, medium for cross

or room entries and light for the rooms—should be strictly followed. Transferring from one size of rail to another is better accomplished by switches than by joints, and if this plan is adopted derailments will be fewer.

The use of parallel-throw switches throughout the mine not only protects the lives and limbs of snappers but also preserves the switch points from damage and eliminates derailments of the locomotive. In setting a normal-throw switch, which is thrown toward the track, the snapper has little time until the locomotive is upon him. Thus hurried he may not close the switch completely. In consequence the locomotive will damage the switch point and on rare occasions will climb over it. The parallel-throw switch, because it is always in the clear whether opened or closed, imparts a confidence to the snapper that moves him to set it correctly.

A comparative freedom from haulage accidents is best attained in one of its elements by careful inspection of mine cars. Some superintendents are beginning to sense that fact, and at least one is a "stickler" for thorough mine car inspection; the highest paid employee on the outside of his mine is none other than the man who inspects the mine cars. That employee is not even burdened with the job of lubrication and hence he can concentrate his attention on inspection.

BRAKES IMPORTANT ON MINE CARS

Brakes are placed on mine cars for a purpose. If we may judge from the indifference which some officials exhibit as to the condition in which they are kept, brakes are merely added through a whim of the manufacturer. How often has it happened that a snapper reached for a brake to check the speed of a mine car only to find that it did not take hold. The result usually is a collision. Only infrequently is there a derailment, but the damage done by frequent collisions of a mine car with another will indirectly cause it to leave the track at some time or other. But because no cars leave the track directly as a result of poor brakes, there is no reason why the brakes should not be carefully watched and cars with poor brakes taken to the repair shop, for the shocks sustained by cars having ineffective braking equipment will inevitably bring them there before long.

The breaking of mine-car hitchings is quite often the cause of wrecks. If the snapper breaks the law by not riding the last car in the trip—which he sometimes does—the breaking of a hitching behind him will drop one or more cars from the trip. The snapper will have no knowledge of this fact. If on a level stretch of track, these cars will block the passage of the next locomotive and may cause a collision. If on a grade, the runaway cars are apt to leave the track by reason of the great speed which they may attain, if they do not collide with a trip coming towards them.

Runaway cars on slopes are likely to cause fatal accidents. Drag bars may be attached to the last car in the trip, but, even so, these do not always act to stop released cars from going down the slope, wrecking at

the bottom where as many as ten men may, in some instances, be at work. Needless to say, a derailing device of some kind should be placed on all slopes to wreck any cars that may run away. Such a derailment will do less damage to life and property than the cars might do if allowed to run wild.

Car hitchings are usually made either of open-hearth steel or double-refined iron. Of the two the latter is by far the better though its cost at the mine is about two cents more per pound than the former. The open-hearth steel tends to crystallize and crack as a result of the innumerable stresses in compression and tension to which it is subject by reason of its hardness. On the other hand, double-refined iron is ductile and consequently will be distorted instead of being broken by the forces acting upon it in the mine-car hitching. Coal companies should be discouraged absolutely from the practice of making their own hitchings. They have neither the facilities for making nor testing them. The manufacturer should test all hitchings before sending them to the mines, for one weak link may cause a loss of life or expose the mine owner to loss by curtailed operation in consequence of a wreck.

DISCUSSION

Mr. MacWilliams said that the Pennsylvania Coal & Coke Corporation had found both safety and economy in the use of 60-pound rail on main haulage, and was using 40-pound rail on room headings. The company is going to use in the future, and in some cases has used for sometime, 25-pound rail in rooms. In regard to brakes he said that it was formerly the practice for the carpenter to hew his brakes using a hatchet for that purpose.

Now, band saws are installed by the Pennsylvania Coal & Coke Corporation at all the large mines so that the brakes will fit the wheels accurately when they are installed, oak being used for that purpose. Mr. Tillson asked whether asbestos might not be used to advantage, and Mr. MacWilliams replied that it would be difficult to use it with the type of cars in service at his mines.

Mr. J. W. Reed said he noted that 70-pound rail was recommended by Mr. Brosky in his paper. The Consolidation Coal Company at one mine was tearing out 70-pound rail on its outside haulage rails and replacing it with rail of the same weight as was used in its inside main-line system. That might seem a retrogressive step, but at this mine there was not enough 70-pound steel to keep the wheels of its locomotives worn down so that their treads would bear evenly on the face of a 70-pound rail. A wheel that has been worn down on a 50- or 60-pound rail would have a contact on a 70-pound rail of only about a quarter of an inch, and the locomotive did not have sufficient adhesion to pull the cars on grades when these were laid with the heavy steel. He did not favor light rail, but he did object to mixing weights where any one locomotive had to travel.

suspended as described the rail would wear at those places. Consequently we used fish plates made of heavier angle iron. To put the rails thus worn in first-class condition, the New Jersey Zinc Company has welded metal on the ball of the rail, but it is a mean job, especially in a wet place. Mr. MacWilliams said he had done that on some frogs, spot-welding them up and grinding them smooth. Mr. Tillson said that he had them ground with a hand grinder.

In reply to an inquiry by Mr. Ilsley, Mr. Reed said that the angle irons put on the bumper of a locomotive, to prevent the cars from climbing and thereby injuring the motorman, should not be too far apart or they would not give protection against the small single bumper car. At the same time they should not be placed too close together, even though thereby the motorman might be absolutely protected against the climbing of cars, for the brakeman might be seriously injured by having his arm caught between the projection and the car. To take a medium course between the two evils the angle irons on locomotive bumpers are spaced 16 to 18 inches apart. A rather wide round bumper is used on the cars.

WEDNESDAY MORNING SESSION

The meeting convened at 10:15 A. M., Chairman Tillson presiding. Mr. Tillson asked Mr. Seip, the secretary, to read the article of Mr. A. J. Hoskin, in the absence of the latter.

THE HAZARDS OF COAL MINE HAULAGE DERAILMENT

A. J. HOSKIN, ACTING HEAD, MINING ENGINEERING DEPARTMENT, UNIVERSITY OF ILLINOIS, URBANA, ILL.

When considering the subject of safety from derailment accidents in coal-mining haulage one must decide that, although every coal miner or operator is familiar with derailment accidents, he is unable to explain more than a small percentage of them and is wholly ignorant of the economic losses they cause by curtailing production and by increasing the wage cost of transportation.

Statistics covering derailment accidents are meagre. Insurance companies and federal and state bureaus classify coal-mining accidents but such tabulations usually are so ambiguous that they do not provide precise data about actual derailment hazards. The writer had experience in this line when compiling data for a recent bulletin on coal-mining haulage.

Haulage accidents both fatal and non-fatal, are usually allotted to seventeen special causes including *miscellaneous*. *Derailments* is one of the seventeen causes but it would seem that accidents attributed to such causes as *switching*, *spragging*, *coupling*, *falling from trips*, *caught between car and rib*, *caught between cars*, *runaway car on trip*, *killed by cars*, *not stated how*, *miscellaneous*, and especially *caught between car and face* could involve derailments. This being admitted, the data given under the single cause *derailment* are insufficient for our present study. Just how far they fall short one can but guess. Many men have been

thrown from locomotives or cars and killed or hurt simply because of derailment. Men have been injured or killed while switching, coupling or spragging because cars jumped the track. Miners have been crushed between trips on parallel tracks by the derailment of cars on one track. Of the many deaths allotted to *killed by cars, not stated how*, it is but reasonable to suppose that a considerable number were due to derailment.

PERCENTAGE OF ACCIDENTS DUE TO DERAILMENT

During the 20 year period 1902-21, there were 782 coal mine haulage fatalities in the state of Illinois. Of these, 43 were positively assigned to derailments, while deaths from causes mentioned above totalled 441. How many of these 441 fatalities were primarily due to derailments? It would appear entirely plausible to assign at least ten per cent of these accidents to derailment, thus practically doubling the number of cases. Derailments then were probably the cause of 11.1 percent of the haulage fatalities. During the 20 year period 1901-20 the haulage fatalities in the United States totalled 6,886. If the Illinois ratio between total and derailment haulage fatalities were to hold good for the country at large, we should conclude—in the absence of precise statistics—that about 764 men were probably killed by derailments in American coal mines during this recent 20 year period, or an average of 38 men per year.

Now these are not startling figures. They are low in comparison with several other prime causes, but when we seek the elimination of every possible hazard in mining it behooves us to seriously contemplate this one source, even if it be comparatively modest. Furthermore, it would seem that such accidents would become even less frequent if due consideration were given to the elimination of the conditions that contribute to derailments.

When we get right "down to brass tacks," we shall find that the principles applicable to safe and efficient surface-railway transportation apply as well to coal mine or any other underground haulage. The coal man can profit by making the fullest adoption and adaptation of railway safety precautions and practices in general.

CAUSES AND MEANS OF PREVENTION

For our present purpose, let us confine ourselves to just the single item of derailment in mines and consider the ordinary causes and the rational means of prevention. Derailments occur commonly when the mine tracks or the rolling stocks are in bad condition. They also occur sometimes when track and rolling stock apparently are as nearly correct as humanly possible. Many a derailment has been unaccountable, and we conclude that there are still interesting problems in safety from haulage derailments.

Much has been done to improve mine trackage since the advent of mechanical haulage. As locomotives have been built of increasing capacity (and therefore weight) tracks have of necessity been constructed straighter, sturdier, heavier and with increasing attention to grade, gauge and rail elevation. It is no longer necessary to educate progressive

operators of this country along these lines for they fully appreciate their economic significance. Much remains to be learned in these matters by the smaller or the old-fashioned mine operators. On the whole, however, I believe we may assume that the majority of coal mining officials are alert in seeking to maintain good trackage and good rolling stock.

Derailments being common at switchpoints and frogs, operators and manufacturers have long co-operated in improvements of these parts of switches. Improvements will continue to be expected. Heavier rails, stronger fish-plates, larger and more ties (preferably concrete or steel), durable ballast, more uniform grades, larger radii for curves—all these are given serious attention by progressive engineers.

If, then, decreases in derailments are to be effected, consideration must be concentrated continually upon these matters and must be used also in an investigative manner to solve hitherto unexplained derailments. There must be no mystery in such practical matters. Perhaps the inexplicable derailments of the past will become plausible when studied in the light of research.

A mine car may possess ample axles and fine bearings. The staunch wheels may be of the proper theoretical shape to flange and tread. The gauge may be just right. The car will travel splendidly and perform its function for many ton-miles, when, suddenly, upon a good straight track, it will climb the rail and perhaps involve adjacent cars in a general derailment. Why does it climb? Possibly there is something incorrect about the wheelbase—the distance between points of wheel contact on the same rail.

PROPER WHEELBASE AND LENGTH OF CAR BODY

In the report of the American Mining Congress' committee on Standardization of Underground Transportation Equipment, the recommendation was made that, for all new developments in coal mining, the track gauge be standardized at 42 inches, and the suggestion was made that the most desirable wheelbase is also 42 inches. The report further states that the length of a car body should be three times the wheelbase and hence of a standard length of 10 feet 6 inches. These conclusions were not reached hastily but are results of long, serious conferences and considerations. They were presumably made to benefit mine operators not alone by the advantages attending standardization of parts but as well by the increased continuity of operations. These latter advantages cover decreased haulage delays caused by derailment with consequent improved conditions from a safety standpoint. Notwithstanding all this, in building mine cars to make sharp track-turns, operators or superintendents have often so abbreviated the wheelbase that it has been a mystery to me why the cars do not jump the track more often.

Any wheeled vehicle is in unstable equilibrium when its wheelbase does not considerably exceed its gauge. The instability is increased if the axles are rigidly connected as in pit cars. It is foolish to expect a mine car of 42-inch gauge and 42-inch wheelbase to perform as well as one of the same gauge and say 52-inch wheelbase. If the body of a mine car is

126 inches long, it could well be expected to ride on trucks at least half that length or 5 feet 3 inches. This would necessitate longer, easier curves or the undue spreading of rails on the curves. I understand and appreciate the necessities for short turns in coal trackage, especially at room-necks, but I believe that, in the ultimate economic analysis, we shall find that most curves can be built much less sharp than is customary at present. In fact the haulage lines of many large mines already have been and are being laid out on easy curves with decided satisfaction to their owners.

DANGER OF LONG WHEELBASE

There is another element of danger in long cars with short wheelbase. When such cars travel over uneven track they roll lengthwise. If, when loaded and moving at usual haulage speeds, they pass over bumps in the track, they so jounce up and down as to alternately lift the front and rear pairs of wheels from the rails, momentarily throwing the entire load upon single trucks. It requires no imagination to decide that this is bad practice and conducive to accidents. The longer the wheelbase, the less will be this trouble. Who would think of riding in a touring car with a wheelbase of ordinary road gauge? I believe derailments can be somewhat minimized by investigations along these lines. One of the classic arguments for the short wheelbase is the greater ease with which a derailed car can be re-railled. In other words, cars are built of such dimensions as to present the hazard of derailment because they are relatively easy to re-rail, when so built.

I conceive a cause of derailment is to be found in long trips or trains. This point is open to dispute, but I am not aware that contenders have ever thoroughly investigated the subject and are fortified with data to sustain the argument that long trips ride as safely as short trips. I have heard men compare coal trips with railway trains in this regard. Such a comparison is unfair. Perhaps the time may come when pit cars will be equipped with airbrakes controlled by the locomotive driver, but, until that time, we cannot expect a long string of pit cars to behave as decorously as a surface train. The cars will continue to crowd on downgrade, and, when thus crowding, there will be interference to the smooth running of the individual cars. On rough track, the drawbar of one car is liable to climb the drawbar of the next car or, if this be prevented by close coupling, the rocking of one car is communicated to its neighbors both ahead and behind with results that sometimes prove so cumulative as to be dangerous. This crowding occurs, indeed, in short trips, but its effects augment with the number of cars per trip. Just what this relationship is remains to be learned. I do not dispute the economic advantages of long haulage trains, but I argue solely regarding safety and propound a problem that might well be the basis for practical research. What is the most economic and the safest number of pit cars for mine-haulage trips?

LOOSE HITCHINGS

Loose hitchings undoubtedly have place in our derailment discussion. There are some advantages in plenty of space and freedom of motion be-

tween cars, as in starting a locomotive with a long trip or in the rotary dumping of cars without uncoupling. On the other hand there are objections, one of which has been suggested in the tendency of bumpers to climb one another. Is it not possible to invent and to construct hitchings that will resist the mutual displacement of bumpers in a vertical direction but that will permit automatic coupling, ease of starting and continuous connection when passing through rotary dumpers?

As previously suggested the hazards due to derailment in mine haulage are but loosely comprehended. Much remains to be learned in this subject. Probably much pertinent data may be gathered during, or as a result of, the present meeting of the Council but probably also many factors will never be known until real investigation is conducted by serious men. Every coal operator can well afford not only to employ technical men in this work but to co-operate with every other operator and with every independent, state or federal research bureau along these lines.

Despite men's utmost efforts to prevent accidents of any sort, such accidents continue to occur and it is a significant fact that, when they do occur, they sometimes amount to real catastrophes. An instance of this that is fresh in our minds was the disaster at an Alabama coal mine involving many fatalities. Diagnosis of this accident differ in identifying the fundamental cause but it appears to have been a unique case involving a runaway derailment, collision of the car with a wall or rib that created dust, and the ignition of that dust by a simultaneous electric spark. Notwithstanding such outstanding calamities, which some men consider freaks and entirely beyond human prevention, I feel strongly that this Council can continue to aim at one hundred per cent prevention of all industrial accidents and that, in this single phase of mine-haulage derailments, there is still a big field for the efforts of every one who is connected with the coal mining industry.

DISCUSSION

In discussing Mr. Hoskin's paper, Mr. Reed said that he was not certain that it was practicable to increase wheel bases so that they would equal or exceed the track gauge. If the pillars did not have to be removed it would be possible to make such curves as would permit of a long wheel base, but as in the removal of pillars the cars have to be run through crosscuts at points where the pillars were subject to excessive pressure it was necessary to use sharp curves and consequently short wheel bases might be necessary.

If the curves were not made sharp at these points the pillars might be squeezed and the roof might be weakened to such an extent as to make extraction dangerous. No end would be served if to avoid accidents due to derailments engineers were to make conditions such that more accidents would occur in pillar workings.

Mr. Green concurred with Mr. Reed as to the danger of excessively easy curves and said that, where the roof was bad, even entries would be less safe if the curves were made too easy, for the entries at the en-

trances to side headings, rooms and entry crosscuts would have to be made wider. He believed that in rooms it was easier to get the curves of sufficient radii to make a long wheel base permissible.

Mr. Murray said that where roof conditions were good or even normal much large wheel bases could be used. At the mines of the Ford Collieries Company a radius of 16 feet 9 inches is being used for room turns and that would permit of the use of a longer wheel base than is now in use. The room turns are not exceptionally wide at these mines.

Mr. Hall said that Mr. Hoskins doubtless had in mind the conditions in Illinois where the pillars are not removed and where consequently no curves are laid inside the room. Not owning the surface the operators have to support the roof and so leave the pillars intact. There are also many mines where the pillars are smaller than in the mines of the Consolidation Coal Company. In such workings it is not necessary to put crosscuts through the pillar to remove the coal. The coal is shoveled to the car standing on the straight road of the room so no curves have to be made in the position indicated by Mr. Reed.

USE SET OF SCRAPERS

Mr. Tillson wondered if it would not be better under the circumstances detailed by Mr. Reed to use scrapers to bring the coal to the car wherever it might be placed and thus make a radical change which would permit of a large wheel base. Mr. Reed, however, said that the scraper needed even better conditions. Mr. Tillson said the scraper could be made to turn corners and could deliver anywhere even on the entry, thus eliminating curves both in the room and at its mouth.

Mr. Ilsley said that the loading machine might bring radical changes both in the size of the cars and in the wheel base. It is conceded that to enable the loading machine to do its best work it will be necessary to have more and larger cars, in order that the machine may be able to work a larger percentage of its time. At the recent meeting of the American Mining Congress it was stated that at a mine where many loading machines were employed they loaded only about 40 tons per shift whereas the ability of the machines when working continuously might be as high as 300 tons per shift. The machine builders believe that the responsibility for the low tonnage rests with the operator. He must change his system of mining to meet the conditions.

Mr. Tillson said he had been convinced by experience that the loading machine was practicable in metal mines with cars of 20- to 30-cubic feet capacity. The New Jersey Zinc Company was employing loading machines with small cars holding from 24 to 66 cubic feet of ore. The use of loading machines has justified itself in the narrow drifts in which that company is using them.

Mr. Green took exception to what was said in the paper with reference to tight hitchings. He had been unfortunate enough to have experience with what were known as stiff hitchings. They were replaced by loose couplings, because in going over a grade they would interlock and would lift one of two cars off the track causing a derailment.

SAFETY IN UNDERGROUND TRANSPORTATION IN COAL MINES—MINE CARS

G. M. GILLETTE, GENERAL MANAGER, CONSOLIDATION COAL CO., FROSTBURG,
MARYLAND, AND J. W. REED, SAFETY DIRECTOR, CONSOLIDATION
COAL COMPANY, FAIRMONT, WEST VIRGINIA

Safety in mine-car construction and maintenance is such a broad subject and involves so much detail that in an article such as this it is possible only to call attention to those facts which seem to stand out most prominently.

The thickness of the seam of coal and the method of mining restrict the width and height of mine cars, and the size of the shaft limits their length. These dimensions enter materially into the safety of the car, but we cannot alter these conditions and must use the size which permits us to get out our coal most economically, accepting these restrictions as we do natural hazards such as bad roof.

The design of bumpers, couplings, running gear and body, however, are features which may be modified, and the safety of their construction, therefore, is open to discussion. The coal-mine car is, and has been for the past ten years, undergoing reconstruction in order to meet the new requirements of electrified mines. Undoubtedly many of our haulage accidents are traceable to the use of a car designed primarily for mule haulage which, with little or no change, has been pressed into service with gathering motors.

The new requirements are that the car be capable of being pushed ahead of the locomotive around sharp curves and be able to withstand more abuse and higher speeds than the mule-drawn car. Safety in present-day mine cars is largely a matter of mechanical strength. Their axles and wheels must above all remain rigid. A flimsy car or even one in which the wheels are merely out of line will cause many derailments.

The means of fastening the axles to the car body therefore is most important. The axles must not be merely bolted to the car bottom. It is necessary that they be reinforced and braced from axle to axle in order that they may be held rigidly in place, and it is better yet to fabricate or weld these braces and the axles into a truck of all-metal construction and then fasten this truck as whole to the car body and drawbar.

Lubrication is important, and roller bearings, grease or oil arrangements by which a constant supply of lubrication is furnished the wheel, decrease the wear on the axle and hub and help to prevent the wheels from becoming wobbly. But of even more importance than lubrication is that the wheel so designed that the hub and axle shall wear evenly. The weight of the car must rest squarely upon the hub bearing. When it fails to do this, the hub will quickly wear conical, causing the wheel to become wobbly. To produce an even wearing of the hub and axle the center of the line where the tread rides the rail must be very nearly under the center of the hub bearing.

WHEELS AND AXLES

In service the wheels always must remain securely fastened to the axle. A washer and cotter key through the end of the axle probably is the oldest and the most common form of fastening. The use of this washer is obligatory as it prevents excessive wear of the cotter key, but unfortunately it frequently is omitted when the old wheels of a car are replaced. Any wheel in which the device by which it is fastened to the axle is not protected against excessive wear is dangerous and one that will be found loose on the axle most of the time. This defect is not confined to the old-style "oil-it-every-trip" wheel, for some roller-bearing and grease-packed wheels have this defect. Many a serious wreck can be traced to such loose wheels, whereas had the wheels been securely fastened the derailments would have been so trifling that the cars could be replaced in a few minutes.

Brakes sometimes are omitted, sprags being used to hold cars on steep gradients. This undoubtedly introduces an extra hazard, and we are disposed to believe that brakes are a necessity in all mines both for safety and efficiency. In a single coal mine brakes of many different designs are commonly found in use. Much might be said for and against almost all of them. The important requirement is that when they are in the off position they must release fully so as not to drag on the wheels and when applied they must put sufficient friction upon the wheels to retard, stop or hold the cars on the grades encountered or as the necessity of the haulage system requires.

Within certain limits the simpler forms of brake riggings are more dependable as they are more easily kept in repair. Of course the brake must be of sturdy construction and to operate satisfactorily it must have provision for taking up the wear of the band or of the shoes by which the pressure is applied.

With compound-lever action the play in the bearings between the movable parts must be carefully regulated. A little too much play in each bearing means much lost motion when the movement finally reaches the brake shoe, and many otherwise well-designed brakes have failed entirely on account of poorly made bearings. If you are having trouble with your form of brake, study carefully the bearings between movable parts. A more serviceable bearing probably will eliminate most of the trouble. Loose bearings are one of the most common causes of dragging brakes, and of course a brake which always rubs on the wheels usually is worn out and useless when needed.

On light grades the two-wheel brake meets with all the requirements of safety, but on heavy grades the four-wheel brake is almost a necessity.

For safety the brake should be applied either by pulling up or back on a side brake and away from the center of the car with an end brake. All brakes must be operated from the same side, which must be that opposite the trolley wire—that is, on the clearance side of the roadway.

The handle or device for operating the endgate latch should either operate automatically as the car is dumped or else be placed within convenient reach of the man standing alongside the car. To locate it so that the man must step on the front bumper to unlatch the endgate is dangerous.

CAR WITH ENDGATE IS STRUCTURALLY WEAK

Both the swing and life endgate type of car cause one entire end of the wagon to be left structurally weak and without side support. Only with difficulty is a car of this kind designed with the required rigidity, and it is not easy to construct one that will keep its shape reasonably well after some years of service. The increasing use of rotary dumps, by removing the need for a swinging or lifting endgate, is overcoming this defect and permitting of a much more substantial type of car.

Where the roof is unusually dangerous and where, accordingly, it is necessary to timber close to the track a crooked car is a menace, for the side of the wagon may strike and dislodge such timbers, greatly increasing the dangers of haulage. Anything that makes possible the use of a more rigid car is a step forward in safety. For this reason I look upon the rotary dump or any dumping system which eliminates the endgate as a safety provision.

Car irons, drawbars and the iron ribs of wooden cars must be designed with more than the strength desired for the car when new, it being customary as soon as the wood portions wear out to rebuild the irons into a new car and to continue doing so during the life of the mine, so that the irons in the car usually have the life of a number of mine cars. The rusting and corrosion during the length of service expected of car irons should be taken into consideration in the original designs of the car.

The design of mine-car bumpers should be carefully considered if safety is to be attained. The old-style double bumper with a three to five-link coupling was the natural outcome of years of experimenting in producing a car suitable for mule haulage. It is a good car for that purpose, but with the electrification of the mines and the introduction of gathering locomotives this type of bumper became unsafe and the cause of numerous accidents. The single and round bumpers designed so that cars may be pushed ahead of gathering locomotives, though they overcome some of the objectionable features of the double bumper, introduce several new hazards which require careful consideration.

Prominent among these hazards with some kinds of round bumpers is the closeness with which the edges of the cars approach each other on curves. When side brakes are provided the brake handle should not protrude past the end of the car. End brakes cannot be applied or loosened from the inside of curves nor can a car with end brakes be coupled safely from that position.

The bumper must be large enough to furnish a good footing for the brakeman riding the rear end of the trip and must hold the cars far enough apart to prevent injury when coupling cars on straight track. The bumpers must be deep enough to prevent them from riding over one another when the cars strike together.

The hole for the removable pin must be made larger through the bumper than through the draw bar so that objects passing through the latter will fall on through and not obstruct the hole. The coupling link should have room back of the fixed pin so that it can slide back clear of the edge of the bumper when cars come together. When two cars are bumper to bumper, 4 or 5 in. of room should be provided between the tops of the clevises holding the link, in order to prevent serious injuries to hands when coupling. The removable pin must be fastened to the car by a chain and should have a wide flange just below the hand hold to prevent the hand of the man making the coupling from being pinched between the pin and the end of the car. The hole for this pin should not be far from the end of the car body.

Much vertical play must be allowed between the link and clevis or when the cars are pushed together the link will bear down upon the end of the next car and raise it off the track at low joints.

As cars vary in capacity from 1,000 lb. to 5 tons or even more, their strength must be calculated for their individual needs. However, within practical limits, if the various parts of the car are made heavier than apparently is required by the strength-of-materials formula, you will have a car more easy to keep in repair, and that means a safer car, for more accidents occur from faulty upkeep than from faulty design.

The following criticism has been made of the statement in this article, "I am disposed to believe that brakes are a necessity in all mines both for safety and efficiency":

"There is a strong tendency now to do away with brakes entirely. With electric haulage and large cars, a car is not supposed to move unless a locomotive is attached to it. In consequence, unless the grades are excessive, the locomotive can apply all the brake power necessary. Most accidents occur by depending on brakes. Frequently these are out of order and a runaway occurs. Better to have no brakes and not depend on them than have brakes that are not dependable."

In replying to this criticism we feel that this is a fact, but we would not recommend dispensing with the brakes at all times. It is most difficult to arrange mechanical haulage so as always to move the car with the locomotive. Though such a manner of operation is possible yet we do not believe it will ever "work out" in the usual system of coal mining.

What is said by this critic about bad brakes also is true, but is this not a question of upkeep, for which the management is responsible? It does not seem that we should abandon the use of a necessary part of the car equipment because its upkeep is likely to be neglected. Should we not aim at eliminating such defects as prevent the brakes from being maintained in proper working order?

DISCUSSION

Mr. Hall said that many engineers have never favored the use of brakes on mine cars. They are nearly always out of commission. When they are put on the sides of the cars they do not introduce any great

hazard, but the man who is responsible for setting the brakes and finds they won't work soon realizes the danger and starts to throw in sprags. In many places where they have brakes they use sprags and forget about the brakes. Apparently the Consolidation Coal Company has its brakes in better condition and uses them. Mr. Hall also said that side brakes appeared to be safer than end brakes.

Mr. Reed took exception to the statement that side breaks did not produce accidents. Statistics of 1,500 accidents show that the many injuries were received in the application of side brakes. These were due it was true to faulty design. The handle of the brake extended back too far, and as a result, when one bumper rode over that of the next car the hand of the man applying the brake was crushed between the end of the brake handle and the car following. Accidents such as these caused the loss of several hands.

Mr. Hall declared that it was relatively not as dangerous as the end brake which, when a man pushed it over, might slip. In this case he would be thrown between the cars. Mr. Reed said that in his experience, many more accidents occurred from side brakes than from end brakes. Accidents traceable from end brakes were rare, possibly because the Consolidation Coal Company uses more side than end brake cars.

However, in some mines the Consolidation Coal Company has end brakes exclusively and the brakemen think they are more satisfactory, than the side brakes. It seemed said Mr. Reed that there was much more hazard with the end than with the side brake, but the statistics do not bear out that conviction. It may be that those mines have been a little luckier than the others. Mr. Tillson suggested that the brakemen, realizing their danger, took greater care in operating them.

Mr. Murray said it was always possible to start an argument on the relative merits of brakes and sprags. The makers of the insurance schedule in Pennsylvania believed that it was well to have on the car some means of control and so put a place in the rating schedule for a demerit based on the absence of brakes on cars. Mr. Trestrail who admitted that he had no brakes on his cars said that the admission that the brakes were always out of order was a reflection on the management which showed that the managers were not absolutely "sold" on the value of safety.

Mr. Green said that he was using a car weighing about two tons and holding four or five tons. There are no brakes on the cars. It is a locomotive mine. Despite the absence of brakes no serious accidents have occurred.

ECONOMY OF END BRAKE

Mr. C. A. McDowell, of Thomas, W. Va., said that the Davis Coal and Coke Co. had formerly used a brake set at the side of the car but now used the end brake finding that it could be maintained at less expense. All the mines of the company in the West Virginia and Maryland division now have end brakes, and they are kept in first-class condition.

Mr. Tillson asked if any had used hand-wheel brakes which he described as being as simple and inexpensive as the lever. He thought it might entirely eliminate the hazard that men would slip, lose their balance and fall between the cars. Mr. Reed said that a man had but a second and a half to put the brake on. He couldn't turn the wheel in so short a time.

Mr. McDowell said that in the application of the end brake the lever was pulled toward the clearance side and never in the opposite direction. The man, therefore, reaches in only to the center line of the car and pulls toward him so there is little chance that he will slip. Mr. Tillson said he might push over the brake from the other side, whereupon Mr. McDowell said that in that case disciplinary measures would be used.

Mr. Hall said that end brakes were usually imposed by pushing. The cam arrangement that presses down the brake beam may become loose and the cam may slip a little sideways and go over suddenly precipitating the man forward if he had put much of his weight on the lever. He has no way to gage in an instant how much weight he should apply.

Mr. W. M. Smith, of the Hockensmith Wheel and Mine Car Company, said that in recent years the practice has been to place a pull brake rather than a push brake on the end of mine cars and that the change increases safety.

In response to Mr. M. H. Curley, Mechanical and Electrical Engineer, of the Sterling Salt Co., Cuylerville, N. Y., who said that the cars at his mine had no brakes, Mr. Reed said that the usual speed of the trip when brakes were applied was about four miles an hour but that when something unusual happened the brakeman did the best he could as long as he could. Mr. Reed added that the brake lever was 26 inches from the side of the car so the body of the man putting on the brakes would not have to be extended more than one or two inches between the cars. The man usually rests one hand on the trip, reaches over and pulls the brake.

Mr. Ilsley remarked that the cleanness of the roads had much to do with safety in braking, that a man was not safe who had to stop along with the trip and in doing so had to walk over lumps of coal and other obstructions of that sort. Mr. McDowell said that the compensation schedule expressly referred to the keeping of the road clean and that all the companies were using that precaution.

Mr. Hall remarked that those remarks sounded well but unfortunately the brakes were always applied in one place and when they were applied the unbraked cars jostled the braked cars ahead, so there was a series of small collisions as the brakeman threw on his brakes, and these collisions frequently caused topping to loosen and fall. Even though the roads were cleaned every night or oftener there was always a probability that there would be more or less coal at the braking point.

USE OF DRAGS

In reply to Mr. Tillson, Mr. Reed said that 75 per cent of the application of brakes occurred at one place. Mr. Tillson then asked why could not a drag mechanism, operated by power, if need be, be arranged above

the floor level to retard the cars without the use of the car brakes. Mr. Green said that a device called the mechanical spragger had been devised for this purpose.

Mr. F. E. Harr, Industrial Claim Agent, Clinchfield Coal Co., of Dante, Va., said that his company was using a side brake which was applied at one end of the car but the company, which had some bad grades, supplemented these brakes on steep grades with a tail locomotive which held back the cars and found it gave better satisfaction than brakes. The Clinchfield Coal Corporation sometimes uses sprags but finds them unsatisfactory as they cause "flat" wheels.

Mr. Murray said that mechanical car retarders were being used in shaft bottoms to hold the cars so that they could be dropped one by one to the cage. It would be necessary to have some means by which these retarders could be released on the return trip.

Mr. Reed said he saw how this could be provided on short grades. Unfortunately it could hardly be devised to work satisfactorily on grades five or six miles long and running consistently five or six per cent.

Mr. Tillson said that with grades such as described it might be well to attach a rope to the trip and brake the drum on which the rope was so expensize that every instance in which one was removed was regarded as a great advance in maintenance.

Mr. N. M. Laidlaw, of Cuylerville, N. Y., asked Mr. Reed if sprags were provided on these long grades and he replied that on some short heavy grades a shoe was provided that went under the wheel and took the wear that a wheel, if spragged, would suffer. The Consolidation Coal Co. tried to prevent the use of the sprag as it had such a bad effect on the tread of the wheel. In reply to Mr. Laidlaw, Mr. Reed said that trips practically never got away except where the grade exceeded 7 per cent.

Even on such steep grades, sprags were not used. The company officials preferred the brake shoe. If a trip gets to going so fast that the brakes cannot be put on, there is no hope of stopping except at a run-away switch. Mr. Reed said sprags could be put in if an expert spragger were at hand but since 1905 or 1906 brakes have been used, and spragging has become a lost art. Some of the boys in early days were remarkable. "I have" said Mr. Reed, "seen trips go by so fast that I couldn't see the spokes in the wheels, yet when the trip stopped I could see sprags in every one." Mr. Reed said that at the Consolidation Coal Company's mine trips were never allowed to run by gravity unless a rope or a motor was attached, but that single cars were sometimes moved by gravity without such restraint.

SUFFICIENCY OF BRAKING POWER

Mr. Curley said the locomotive should have sufficient breaking power in almost all cases to hold the trip so that dependence would not have to be placed on the car brakes. He said he could readily understand that the keeping of brakes on the many cars in a mine in operating condition must be a difficult and expensive proposition.

Mr. C. L. Petzel, Safety Engineer of the New Jersey Zinc Company, Franklin, N. J., said that it seemed that the tractive power of the locomotive was somewhat overtaxed if the brakes on it were not equal to holding the trip without help from the brakes on the cars.

No one replied to Mr. Petzel, but it may be explained that in many mines long heavy gradients favor the movement of loads, and the locomotive has only to haul empties up those grades. Furthermore it is not unusual practice to bring longer trips from the parting, when they are cumbering the tracks, than are hauled back to the parting, simply for the reason that such trips can be moved in that direction. Whether that is true of the Consolidated Coal Company is not known to the annotator.

Mr. Reed said that Mr. Gillette and he himself in the paper presented, did not intend to convey the idea that brakes were necessary on cars, for assistance in holding back trips on main-haulage gradients but were needed in restraining individual cars from running away when being handled in rooms or to hold the cars on a side track when it was necessary to divide the trip. Of course, a car should be blocked when thus left, but if a single car were detached from the trip the miner who so detached it should be provided with a brake on the car so that he could control it.

He added that after a miner has loaded his car at the face he usually desires to fire a shot in the coal. If he leaves the car in place and fires his shot the force of the blast may throw heavy pieces of coal at the end of the car, and in a short time the end thus exposed to the violence of blasts will be battered in and will need to be repaired. The miner should be able to let the car run back by gravity 10 or 15 feet from the end of the track and should be given the means for stopping it and blocking it at that point. Then he can shoot his charge without injuring the car and making it unsafe for transportation.

In pillar work the miner should be able, when conditions demand it, to run the car out of his place, otherwise should the place cave the roof may fall on the car so that it cannot be recovered. Of course, the officials try to arrange the places so that the coal at the end of the pillar can be removed completely several hours before the roof falls. Occasionally, however, the roof does not delay its descent so long. The rock may come down two or three minutes after the coal is loaded. If the car cannot be removed it is crushed by the falling rock. Consequently, it is necessary to provide means that will enable the miner to stop a car should he remove the blocking and permit the car to run by gravity away from that part of the room where the fall of the roof is imminent. Mr. Reed said also that not only is it proposed to remove the brakes but to do so on cars having an overhung body. Thus designed sprags cannot be used in place of brakes. That Mr. Reed said "is where I am beginning to make objections."

TYPE OF CARS

Mr. H. J. Seitzinger, Safety Engineer of the Lehigh Coal and Navigation Company, Lansford, Pa., described the conditions at their mines in regard to the types of car used, the brakes and the gradients. The cars

were all of one type and are constructed of either wood or steel. Most of the steel cars have end brakes. The car runner when braking the cars, stands on a "stepper" on the side of the car, holding on with one hand to the grip rod near the top of the car. In this position there is little risk of his slipping or falling. The haulageways are driven on a standard gage of 0.58 per cent, the maximum grade, which is around the shaft landings, being not more than 2 per cent. Sprags are used in stopping and controlling cars that have no brakes.

Mr. Tillson asked whether in a mine with such gradients brakes were needed and Mr. Seitzinger said, that brakes were not needed in the main haulageway, but were used merely to control the cars at the shaft landing when dropping them on the cages. Mr. Tillson added that it had been his experience in metal mines that with gradients up to two per cent brakes on cars were not needed. Amid laughter, Mr. Reed added that they needed grease not brakes.

The chairman called on Mr. Colburn to present the Safe Practices Pamphlet on "Maintaining Safety Interest in Mines." Mr. Tillson then explained that the pamphlet had been in the making for a year, that this was a tentative draft prepared by Mr. G. M. Gillette and E. H. Denny. As this paper will be printed when duly revised none of it will be published in these proceedings.

At the close of the summarization of the report Mr. Tillson remarked that after ten or eleven years of intensive effort the Mining Section had not been wholly successful in holding the interest of the staffs and of the chief executives in safety work. He thought that one of the hardest tasks of the safety engineer was to maintain the interest of chief executives in the safety campaign.

Mr. J. T. Ryan was then asked to give his demonstration of the effect of carbon monoxide on animals. Mr. Ryan said that carbon monoxide was not only found in coal mines but also in metal mines when fire occurred. It was found also in the construction of sewer tunnels. He described it as "a prevalent and dangerous gas with which we all have to deal."

Mr. Ryan showed the effect of carbon monoxide on a mouse, rendering it insensible after a period of some activity. He then restored it to active life by the administration of a mixture of 25 per cent oxygen and 5 per cent carbon-dioxide. He also explained the all-purposes gas mask which enabled work to be done in carbon monoxide. This universality was attained by the addition of hopcalite, a mixture of oxides, which by catalytic action, which left it unaffected, converted carbon monoxide to carbon dioxide, an irrespirable gas without unfavorable effect on the human organism.

The chemicals in the mask would take an atmosphere containing the deadly monoxide in quantities sufficient to render a person unconscious in five minutes and transform it instantly into a comparatively harmless gas. It was necessary to keep it dry. Consequently the atmosphere had to pass before reaching the hopcalite through a moisture absorbent.

He also showed a small mask for self-rescue purposes. This mask is kept air-tight by a lead-sealed cannister until needed, when the lead sealing could be torn off, and the mask could then be used for passing through a vitiated atmosphere. Mr. Ryan also showed the operation of an equipment for ascertaining the quantitative presence of carbon monoxide in the blood. All these pieces of apparatus had been developed, at least in principle, by the Bureau of Mines. The meeting adjourned at 12:30 p. m.

THURSDAY MORNING SESSION

The meeting convened at 9 a. m., Chairman Tillson presiding.

Mr. Colburn presented in greater detail portions of the Safe Practices Pamphlet on "Maintaining Safety Interest In Mines." Chairman Tillson called for the report of the Nominating Committee, of which Mr. J. T. Ryan was chairman.

REPORT OF NOMINATING COMMITTEE

Secretary Seip, then presented the full recommendation of the Nominating Committee. Chairman, R. Dawson Hall, Engineering Editor, Coal Age, New York City; First Vice-Chairman, John L. Boardman, Safety Engineer, Anaconda Copper Mining Company, Butte, Montana; Second Vice-Chairman, J. B. Warriner, General Manager, Lehigh Coal and Navigation Company, Lansford, Pennsylvania; Third Vice-Chairman, George Martinson, Safety Engineer, Pickands Mather Company, Hibbing, Minnesota; Secretary, C. L. Colburn, Mining Engineer, U. S. Bureau of Mines, Washington, D. C.

The chairman having asked for nominations from the floor and Mr. Reed having seconded the report of the Nominating Committee the persons named were unanimously elected. After brief words of acceptance from Mr. Hall, Mr. Tillson introduced Mr. Charles L. Jones.

THE FUNCTIONS AND PRACTICAL USE OF LIQUEFIED CARBON DIOXIDE IN FIGHTING MINE FIRES

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The public importance of mine fires has possibly never been appreciated by mine operators themselves. Statistics to show the annual loss from this type of hazard are altogether lacking. On account of the natural and proper reluctance of mine operators to advertise the hazards of their business, it is safe to state that many mine fires pass unnoticed by the press, the public, or the technical literature. In many states no attempt is made to keep records of this kind of fires, and no complete record is kept by the United States Bureau of Mines. It is safe to state, however, that the average loss per fire is far above the average for all classes of fires.

More than usual dread attaches to mine fires perhaps on account of the relatively large unit cost, and because of the peculiar hazard to life that

sometimes exists. But there is another side to this picture, and from the standpoint of the fire extinction specialist mine fires offer a fertile field for the application of sound engineering principles. In most industrial fires, an emergency is to be dealt with that must be conquered or submitted to within a space of hours. In mine fires also the first minutes and hours are the critical ones, but, if the fire is not conquered in its incipiency, recourse may be had to stopping it off—an expedient not available in other types of fire. Once a mine fire has been stopped off, sufficient time may be taken to make a study of it, and to plan its extinction by sound engineering principles instead of by snap judgment. The fire is, so to speak, bottled up in a giant test tube in which its condition and extent can be analyzed and diagnosed with the tools of the chemical engineer—gas analysis, temperature, and pressure. In no other type of industrial fire can this kind of chemical control be exercised.

When a mine fire has reached this stage and after it has been bottled up, only one means is known of extinguishing it, namely, to submerge it with a fluid that will not support combustion. The fluid may be water, and this is sometimes used, although it is often impossible to flood, and flooding in many instances imposes heavy reclamation costs. The fluid may be an inert gas produced by the fire itself, and if it were not for the fact that stoppings, soil, even the rocks themselves are anything but gas tight, no other source of inert gas would be necessary. On the other hand, the fluid may be an inert gas introduced artificially from without.

INERT GAS USED SEVENTY YEARS AGO

The use of inert gas for fighting mine fires is not new. Successful applications of flue gases to the extinction of coal mine fires have been reported as long ago as 1851, when a fire at Clackmannan, Scotland, was extinguished by flue gases injected into the mine mouth by a jet of steam.¹

In 1875 Barber² described the then newly developed methods of transporting liquefied carbon dioxide in steel cylinders and proposed its use in extinguishing fires on shipboard, and since that date liquid carbon dioxide has been tried a number of times.

In these various attempts all degrees of success have been met, from complete effectiveness to entire failure, depending upon the conditions of application and the amounts used. Each fire is a problem in itself, and we know that if sufficient carbon dioxide or other inert gas is used, any fire can be extinguished, but good results from an economic standpoint can be expected only when conditions are such that the amounts of inert gas required will not be prohibitive in cost. Economic considerations will be taken up further on.

Interests in the inert gas method of mine fire extinction has been re-awakened by the recent application of liquefied carbon dioxide to a large fire in the Bitner Mine of the H. C. Frick Coke Company, in which

1 *Mines and Minerals*, June, 1908, 505.

2 *American Chemist*, 5 (1875), 395.

the writer was fortunate enough to play a small part. Inasmuch as this fire has been recently described fully in the literature,³ it will be discussed here in brief outline only.

THE BITNER FIRE

The Bitner mine is a rather old drift mine with a considerable area of gob and old workings under light and leaky cover. In the part of the mine in which fire occurred, a main haulage way, manway, and airway extend in a direction approximately parallel to the general direction of the outcrop of the coal seam. Coal has been mined on both sides of these workings retreating towards the main haulage way from the outcrop on the east side, and from old and comparatively tight gob on the west side. Fire broke out on the night of November 16, 1922, and on account of the leaky cover, it was decided that the fire could not be extinguished by sealing off. Because of the dip of the seam, it would have been impossible to flood any considerable part of the fire zone, and it was therefore decided to fight the fire by the direct method. Material and men were mobilized, and water was used in the largest quantities obtainable for approximately one month, but the fire had gained such headway that it spread in spite of the best efforts of the fighters, until the length of the area actually on fire was 2400 feet. At this juncture Mr. J. R. Campbell, Chief Chemist for the Company, suggested that inert gas be considered. On December 13 it was decided to try liquefied carbon dioxide, and by the afternoon of December 16, 1440 50-pound cylinders of carbon dioxide had been hauled over 60 miles to the mine by motor truck, a line of 25 brick stoppings had been erected in the mine in entries leading to the fire zone, some of the surface leaks caused by falls along the outcrop of the coal seam had been sealed by blasting and tamping clay, facilities had been provided for discharging gas into the mine through three boreholes, and at 3:00 P. M. the first gas was discharged into the mine. Much better time might have been made had it not been necessary to plan and construct discharge facilities on the ground.

The drums were discharged into the mine through boreholes from the surface. They were attached to manifolds of 2" piping in units of five, the drums being placed on racks at an angle of about 20° with the horizontal valve downward. In general the five drums of each unit were discharged all at once by opening the valves wide, and were changed on regular schedule, allowing from two to eight hours between changes. However, the schedules were laid out on a basis of the trend of gas analysis, temperatures, and pressures, and on one occasion a drum was discharged completely in less than thirty minutes, while on another, drums were changed only twice daily. Each of these units was housed in a temporary shelter, provided with a salamander for keeping the men warm. No difficulty was experienced with the discharging of the cylinders, and all work to be done can be handled by common labor. When

³ *Coal Industry*, 6 (1923), 272-9; *Coal Age*, 24 (1923), 3-10.

attempting to discharge a cylinder in less than about three hours under the conditions which existed at Bitner mine, it was necessary to heat the valves occasionally with blow torches to keep them from being plugged up with carbon dioxide snow. In part as a result of this experience, means have since been developed of discharging these cylinders in much shorter periods than three hours, without the inconvenience of heating the valves.

CARBON DIOXIDE

A word should be said in explanation of the source and purity of the carbon dioxide which is commercially available. The present annual production of this material in the United States amounts to about sixty million pounds, selling at an average price according to Census figures of 11.7c per pound, but commanding considerably lower prices in quantity. Small quantities are made from magnesite, by fermentation, and from natural mineral springs, but the bulk of the production, over 90% in fact, is obtained from the combustion of coke. High grade coke is burned under specially constructed boilers, with carefully regulated draft, producing flue gases with 17 to 19% carbon dioxide. These flue gases are scrubbed to remove dirt and sulphur compounds, and the carbon dioxide is then absorbed in sodium or potassium carbonate solution, from which it is boiled out over 99% pure. Modern plants are balanced so that there is just enough steam produced from the combustion of the coke to operate the machinery and compress the carbon dioxide into cylinders.

The gas is sold in two sizes of containers, holding respectively 20 and 50 pounds. The fifty pound size is 8½ inches outside diameter by 51 inches long, and averages slightly over 150 pounds in weight when filled. Accidents in handling the cylinders are almost unknown. Fifty pounds of carbon dioxide occupies 408 cubic feet at 32°F. and 760 mm. pressure, but it may be figured conservatively as displacing 450 feet under average temperature and pressure conditions, and may, of course, occupy much greater volumes at higher temperatures, such as are met with in mine fires.

Turnover on carbon dioxide cylinders is rather slow, and since investment in containers is very high, interest charges, depreciation, and maintenance of cylinder equipment total as much as manufacturing cost. The cost of the gas is therefore apparently high, but, as will be shown it compares very favorably with other methods of mine fire fighting for the results obtained.

The refrigerating effect of the gas expanding from the cylinders deserves especial mention. When the gas is discharged, this refrigerating effect is sufficient to reduce a part of the carbon dioxide to a solid snow the temperature of which is approximately 100° below zero Fahrenheit. The cooling effect of this snow is not great as compared with the effect of the gas in excluding air, but is important nevertheless.

CHEMICAL CONTROL OF BITNER FIRE

In directing the application of carbon dioxide to the Bitner mine fire, the fullest possible use was made of gas analysis, temperatures, and

pressures, as indications of conditions in the sealed-off area.

Over 800 gas analyses were made of samples collected systematically at regular intervals at the various stoppings. Daily temperature readings were taken at fifteen points surrounding the fire zone, and some temperatures were also taken at the bottom of the boreholes by means of maximum-minimum thermometers and thermocouples. Pressures were taken a part of the time by means of an Ellison draught gage, and were otherwise noted as positive or negative. The interdependent variations of temperature, pressure, and gas analysis showed many interesting relationships and the dependence of all three on the barometer was also noticeable. Some of these relationships will be brought out in support of the writer's conception of the mechanism of inert gas extinction of this kind of fires.

PRESENT CONDITION OF BITNER MINE

Gas was applied in large quantities from December 16 to December 25, after which the rate was slackened considerably, and small amounts were then introduced until March 19. On March 26, a new opening was broken through the coal approximately in the center of the first zone, as indicated on the map. Starting from this point, on June 1 the fire area had been reclaimed from end to end along the main haulage way and air return, and along the gob area on the west side of the mine, which connects Bitner with adjoining mines. Some hot coals were found, but these were in small pockets in places where the gas analysis indicated that carbon dioxide had not been very effective, and they were so small in extent as to be easily loaded out. It is worthy of mention that the early stopping of combustion by inert gas, combined with the slow cooling as compared to the direct use of water, resulted in causing less falling of the roof.

Coal is now being produced from the reclaimed area. Smaller areas on the east side of the mine, that is, along the outcrop, have been sealed up pending the time when it will be convenient to explore and reclaim them. So far as is definitely known, there is no flame in these areas, although hot spots may still exist. Exact conditions in these small areas will not be definitely known unless and until they have been explored. For obvious reasons, some worked out parts of the area may never need to be opened.

FUNCTIONS OF CARBON DIOXIDE

Many questions arise in connection with the use of carbon dioxide. How does the gas act? What is the difference in its action between shallow and deep mines? Between tight and leaky fire zones? Between coal and metal mines? What is the importance of leakage? How long should it require a fire area to cool? Can water be used in conjunction with carbon dioxide? These and many other questions come to mind.

HOW LONG SHOULD IT REQUIRE FOR A MINE FIRE TO COOL?

The extinction of a fire is not a simple question of putting it out or letting it burn, but is an exact problem in heat engineering, in which,

unfortunately, many of the constants are unknown. There are all possible degrees of success and failure between letting a fire burn vigorously and putting it out immediately. The behavior of the fire depends entirely upon the relation existing between two heat quantities—the amount of heat generated by the fire and the amount dissipated by conduction through strata, by drainage, by gas leakage, or by cold inert gas introduced into the mine. Fortunately, both of these heat quantities can be controlled to some extent. We know that if a smoldering fire continues to burn without much change over long periods of time, the amount of heat generated by the fire must be about the same as the amount of heat dissipated. If the amount generated becomes greater by reason of better heat insulation, increased draught, or change in the character of the combustible, we say that the fire has kindled or increased, as the excess available heat has ignited new quantities of material. On the other hand, if the amount of heat generated becomes less than the amount dissipated, we say that the fire is dying out, since it must necessarily cool.

Now it is self-evident that the heat generated in a sealed-off area is proportional to the air leaking in to feed the fire. Likewise it is obvious that the time required for a sealed-off mine fire to cool depends upon the amount by which the heat quantity dissipated in unit time exceeds the amount generated. The introduction of inert gas in any amount whatever excludes some air, even when conditions are such that the inert gas is only partially effective. In excluding air this introduction of gas that will not support combustion must affect the heat balance, decreasing the amount generated, without greatly affecting the amount dissipated, and therefore it must accelerate the cooling of the mine, if the sealing is sufficiently thorough to extinguish fire without its assistance. If the sealing is not sufficient in itself, then the gas may even extinguish fire which before its introduction was growing in size.

Let us examine these two heat quantities to get some idea of their order of magnitude.

HEAT GENERATED AND LEAKAGE

It is obvious that the heat generated by a fire is due to combustion which requires air for its support, and hence when a fire is sealed off, heat generated depends directly upon leakage.

Now many, many mine fires are extinguished by simply sealing off, but when we speak of a tight seal we use a term that is merely relative. There never was a mine fire sealed off in a manner that even approached air-tightness. Not only do actual cracks and openings around seals or through the earth allow leakage, but often the seal, the rock, even the brick and mortar of the stoppings themselves may allow considerable leakage.

As an example of the importance of the transpiration of gases through brick walls, and the leakage through small cracks, may be cited some of the experiments of the Research Laboratory of the American Society of Heating and Ventilating Engineers. In one test a room of approximately 1000 cubic feet capacity, having an 18 inch plastered brick wall, and

weather-stripped windows, was closed tight. The leakage through walls and cracks caused an infiltration of 7780 cubic feet of fresh air per hour when the wind velocity against the side of the building was 8 miles per hour—a complete change of air in a little over an hour. This laboratory is now conducting further tests which should yield direct figures for the leakage of gases through a 13 inch unplastered brick wall, and these may be expected to furnish additional evidence.

Furthermore, evidence of leakage is found in facts well known to mining men. While stoppings are sometimes blown out by slight explosions and by rapid readjustments of gas volumes and direction of air currents when the seals are first placed, it is not possible to maintain any considerable pressure difference across a brick stopping for any great time. The writer has noted changes of the barometer of the order of one inch in twenty-four hours at the Bitner mine fire. Had the fire zone been air tight, this would have necessitated a pressure difference of about one foot of water across the stoppings. Such pressure differences may be found in some instances, but no long sustained pressure across a brick stopping in excess of a few inches of water has ever come to the writer's notice. Further, if a hot fire area when sealed off has an average temperature of 212°F., which is surely a low and conservative estimate, and if the fire is extinguished by sealing alone, the gases in this zone should contract about 25 per cent. by volume in cooling to normal temperature. Now if the area were really tight, a pressure difference of over three pounds per square inch, or over seven feet of water gage, should be observed across the stoppings. No such pressure is observed in practice, as the pressures have been equalized through air leaking in. And the air which has leaked in has combined with combustible matter to delay the cooling of the mine, or if the leakage is great enough, to kindle the flame.

In the above example an initial average fire area temperature of 350°F., which is not impossible, would result in a pressure difference of over ten feet of water gage, in cooling to normal temperature.

In controlling this leakage the obvious remedy is to follow up thermal contraction and compensate for barometric fluctuations as far as possible by introducing inert gas into the sealed-off area in place of air.

HEAT DISSIPATED—SHALLOW VS. DEEP MINES

The quantity of heat dissipated by a mine fire is more difficult to estimate than the quantity of heat generated. Indeed, the best that can be done is to make an outside estimate based on a number of conservative assumptions, for not only is each mine fire a problem in itself, but in individual cases many unknown factors may enter into the case.

There is a common impression among mining men that a long time is required for a sealed-off area to cool to normal temperatures, and indeed it is true that most of the strata which surround mine workings are very poor conductors of heat. On the other hand, the writer believes that the long periods, sometimes of years, required in practice for sealed-

off fires to cool to normal temperatures, are caused by inleaking air, generating enough heat to delay cooling, but not enough to prevent eventual extinction of the fire.

Let us assume first a bed of coal burning on the floor of the mine, having a depth of three feet, and a bulk specific gravity of 50 pounds per cubic foot, and thus weighing 150 pounds per square foot of area. This is felt to be very conservative, since the workings on fire do not include 100% of the area, there being no heat to dissipate to adjoining strata from the interior of pillars, walls, etc., which have been afire only on the surface. In some instances roof coal, slate, etc., are burning on the floor in piles deeper than 3 feet, but this estimate of 150 pounds per square foot is certainly far above the average amount of material on fire in mine fires of any type.

Let us further assume that carbon dioxide has been used in such quantities as to exclude all air leakage whatsoever, so that the only heat to be dissipated is that in the hot coals. Assume the temperature of the coal to be 1000°F., which is certainly above the average. The specific heat of coke is given in Marks' Mechanical Engineer's Handbook as 0.203. Taking this as .25 we have an outside maximum amount of heat to be dissipated of 35,000 Btu. per square foot of floor area. This is to be dissipated, let us assume, altogether by conduction into adjoining strata, half going into overlying strata, while half goes into underlying strata. Assume the initial temperature of the rocks as 60°F., and assume that the mine is to be opened when the temperature of the workings cools to 70°F. We will then have heat transfer taking place until a uniform gradient is established some distance above or below the workings. If the thermal conductivity of the surrounding rocks is assumed uniform, this gradient will pass from 70°F. to 60°F. heating a mass of rock to an average temperature of 65°F. 0.200 may be taken as the conservative average specific heat of surrounding strata, and in this case it would require 17,500 pounds of rock to absorb the heat at an average temperature increase of 5°F. If the average specific gravity of the surrounding rocks is taken at 2.0, this means that in cooling this hypothetical mine to 70°F. the temperature gradient would have to be established a distance of 140 feet above and below the strata in order to absorb the heat. Every constant assumed in this estimate is so conservative that it is safe to say the required distance in practice is much less than this.

In the Bitner fire considerable areas never reached by water were cooled almost to normal temperature before opening up the mine, yet the surface of the ground where the cover was only 30 feet was not appreciably warmer than the ground in other parts of the vicinity. As the weather during much of the time hovered about the freezing point, any great heating of the surface would have been noted.

The writer would draw from this that there is not any pronounced difference between deep and shallow mines as regards the rate of cooling to be expected, at least where inert gas treatment is undertaken at an

early stage. In the case of very old fires which have had ample opportunity to establish temperature gradients for long distances from the seat of the fires, cooling would be much slower, and the shallow mine would probably show some advantage.

The rate of transfer of this amount of heat would be very great at first decreasing to very low values as the temperatures become equalized. This decrease is not a straight line function, but depends upon the temperature difference, which by assumption is 930°F. at the start of the cooling process, and 10°F. at the conclusion. To avoid the calculus it will surely be conservative to base an estimate upon an average temperature difference of 40°F. between the hot coals and the adjoining strata. On this basis the time required would be 2187 hours, or approximately three months.

The writer believes that this estimate is based upon such over-cautious assumptions that it is many times the period actually required under average conditions if all leakage of air can actually be eliminated, and that three months may therefore be regarded as the outside maximum period required for any mine fire to cool, where the generation of additional heat by leakage of air can be absolutely eliminated.

Under practical conditions it will usually be found uneconomical to attempt to produce this result. Gas analysis and pressure observations show that in the treatment of Bitner mine fire considerable amounts of air leaked in from time to time. Zero oxygen was reached at several points occasionally, indicating what might have been obtained if all leakage had been prevented, but the real aim of the gas treatment is to compromise between the desire to economize gas and the desire to reopen the mine quickly.

Another point which should be emphasized is that where fire areas are too leaky to extinguish themselves, gas application must be continued in sufficient amounts to put the fire out. Encouraging results at first in such cases should not obscure the fact that such fires will grow gradually worse if not treated with sufficient amounts of gas.

USE OF WATER

The use of water as a cooling and quenching agent cannot be too strongly recommended. Its dangers when applied to hot coals in quantities short of actual flooding are too well known to need rehearsal, but the danger of generating large amounts of water gas, causing explosions, and so forth, is very much lessened in the presence of inert gas, and water may be used to advantage especially in the later stages of cooling a sealed-off area which has been gas treated.

In the treatment of the Bitner fire small areas were actually flooded, and of course in these areas the gas treatment played no part whatever. Water could not be gotten to certain other parts of the zone, so that in these parts the water played no part. In still other parts of the fire area, water was used with great effect to produce rapid cooling, but this water was not introduced until the gas analysis showed that the danger

of spreading fire or causing explosion was nil, and until the temperatures recorded were near the boiling point of water. When water is used under these conditions, cooling can be much accelerated and the good effects produced entirely outweigh the undesirable tendency of the water to absorb carbon dioxide. It was impossible to flood these areas, water being simply run through them to absorb heat, and it may be noted that the effluent water from these sections was never very hot, as water was not used in this way until two weeks after introducing carbon dioxide.

USE OF CARBON DIOXIDE IN METAL MINE FIRES

The preceeding remarks have been applied more particularly to coal mines, although the general theory discussed will hold for any fire enclosed by more or less leaky surroundings.

In metal mines conditions are so vastly different from those in coal mines, that the writer hesitates to discuss them. There can be no question of the fact, however, that fires of all kinds are spread mainly through gaseous combustion, or flame, and not through the conduction of heat through incandescent solids. There is a wide difference between the percentage of carbon dioxide required to extinguish flame, and the percentage necessary to extinguish incandescent carbon. In fact, it is not believed that the latter object can be attained under practical conditions by the addition of carbon dioxide, unless the amount of combustible is great enough to absorb much of the oxygen remaining in the sealed-off area. This is often not the case in metal mines, as fires are usually confined to timbers, and the amount of timber varies from mine to mine.

The writer is hence inclined to doubt the effectiveness of carbon dioxide for altogether *extinguishing* fires in metal mines. On the other hand, the addition of ten to fifteen per cent carbon dioxide to the atmosphere of a sealed-off metal mine fire will undoubtedly extinguish flame, and thereby check the rapid spread of the fire.

With the increasing development of oxygen breathing apparatus, the day is to be foreseen when many metal mine fires will be sealed-off as well as possible in an emergency, seals being placed in accessible locations. The fire zones will then be gassed with moderate amounts of carbon dioxide, which will check the spread of the flames and prevent the formation of smoke to some extent. Helmet men can then be sent into the fire areas to make a thorough exploration, possibly to cool hot and incandescent charcoal with water, but in any event to construct stoppings at advantageous locations very close to the actual fire, reclaiming large parts of the mine which are often sealed-off because they are inaccessible or filled with smoke when the stoppings are constructed. With the fire areas thus localized, further treatment with gas, water, sealing, flooding, filling in, or any other means can be proceeded with intelligently and at comparatively small expense.

LIQUEFIED CARBON DIOXIDE COMPARED WITH OTHER INERT GASES

Other inert gases have been proposed for fighting mine fires, namely, sulphur dioxide, nitrogen, and flue gases. Sulphur dioxide in liquid form

is expensive and not always available. As a flue gas from burning sulphur on the spot, it is not of satisfactory composition, and introduces complications by making irrespirable the atmosphere in parts of the mine outside the fire area.

Nitrogen is obtained in large quantities in the manufacture of oxygen by the liquid air process. The ratio of shipping weight to the weight of gas contained, however, introduces high transportation charges, so that nitrogen as such need be considered only when the fire is near the source of nitrogen. Further, carbon dioxide is more effective than nitrogen in extinguishing flame.⁴

Flue gas is the only serious competitor of liquefied carbon dioxide for fighting mine fires. But flue gas is not so effective as carbon dioxide on account of its oxygen content, it is not as quickly available, it is not as easily transported and distributed over large areas and to difficultly accessible places, and it requires for its production expensive equipment and careful control.

In most cases a supply of liquefied carbon dioxide can be obtained from the nearest large city much more quickly than equipment for producing and cooling flue gas can be erected. The production of flue gas with low oxygen content requires chemical control and careful regulation of draft, and the availability of large amounts of cooling water is an additional necessity. The expense of using flue gases will prove greater than the cost of liquefied carbon dioxide, unless sufficiently large amounts are to be used to write off the cost of the flue gas generating, cooling, and transporting equipment.

The writer believes that liquefied carbon dioxide and flue gases have distinct and special fields, and that flue gases should be used where the amounts will be large enough to pay for the necessary special equipment, and where other conditions are favorable and sufficient time is available to install and operate this equipment.

COST OF LIQUEFIED CARBON DIOXIDE TREATMENT

The amount of liquefied carbon dioxide used, and hence its cost, will depend upon the amount of the leakage and the length of time during which gas application must be continued. These factors will vary for different mines.

In the case of the Bitner Fire, the actual cost of the carbon dioxide gas alone was less than 10% of the total expenditure, the remainder being largely the expense of direct method fighting. Under average mine fire conditions, if there are any average conditions, bad mine fires can probably be extinguished with inert gas for less than 50 per cent of the cost of the direct method.

In many cases where the use of inert gas is not necessary, it might so expedite the opening up of sealed-off areas as to repay its cost many times over.

⁴ J. K. Clement, "The Influence of Inert Gases on Inflammable Gaseous Mixtures," U. S. Bureau of Mines, *Technical Paper 43*.

DISCUSSION

Mr. Tillson said that in conducting some tests with a producer, burning carboniferous shale, with a large ash content and a low content of carbon, a condition in which one would think it would be difficult to maintain combustion, he had maintained the fire despite the fact that the oxygen zone had only five to six per cent of oxygen.

He argued that the conditions of the test were unusually vigorous because the average velocity of the circulating gases being 1,000 feet per minute, the sensible heat was carried away with great rapidity, whereas in a sealed mine where the gases were scarcely moving the heat would be retained by the coal.

Mr. William G. Duncan, Pennsylvania State College, School of Mines, said that the fire probably started at two points (1) at No. 1. Butt in the kick-back section and (2) at the entrance to the new crop haulage. The first fire originated so far as is known, at the crop-holes near the kick back and traveled across No. 1 Butt and the main haulage. The other worked its way along the dip haulage and up to No. 6 Butt.

These fires were separated and remained so, being at no time less than 1,200 feet apart. The fire was first attacked by water, eight lines of hose being used with a half-inch nozzle. After 84 hours of fighting by water the fire gained such headway owing to the defective water supply and pressure that the fire spread in the kick-back section from No. 1 Butt to the drift mouth, the point where the main haulage entered the mine.

No rain had fallen for several days, and all the reservoirs were nearly empty. Consequently, water was scarce and most of the little that was available was used to water the coke in the ovens, to feed the boilers, to supply the houses and for the other surface purposes. Owing to the demand for coke, and other reasons it was necessary to keep the ovens in operation.

Hence only what might be termed "spare water" was used to fight the fire. In consequence on many occasions the water merely dribbled from the hoses of the nozzles. At times when a canvas brattice erected to fight the fire would begin to smoke and later to burn, the stream from the nozzle of a hose would not have sufficient power to reach the cloth. By whirling the hose or throwing it back and forth a little water could be thrown on the fire but its effect was as if water had been thrown by hand.

On other occasions the hose and nozzle were attached to a long pole and so extended to the desired point and as insufficient water flowed from the orifice, the hose burned and the nozzle actually melted. As there were two fires it was necessary to fight them separately in order to save the fans and the mine.

MINE IS SEALED

Despite these adverse conditions, the fire at the main opening was fought by hose and water, and burning coal was loaded at points between the main opening and the curve at No. 1 Butt. At length, as the drought

continued to curtail the available water supply, the mine was sealed. The fire had been found on the night of November 16, 1922, and the mine was not sealed till December 15 or 16 of that year.

Over several portions of the affected mine area, boreholes had been drilled, not for the purpose, be it understood for fighting the fire with liquid carbon dioxide, but to act as return air courses when fighting the fire with the hose. Some of these were of large diameter, one being of approximately 8-inch radius.

The area sealed contained approximately 2,000,000 cu. ft. of air space. The mine was reopened on March 27, 1923, at a new opening into No. 9 Butt which lay between the two fires. Between December 16 and December 25 large quantities of liquid carbon dioxide had been discharged into the sealed mine. On December 26 or 27 the quantity of carbon dioxide being discharged into the mine was greatly reduced, but during the whole period approximately 2,500,000 cubic feet of the gas was used for the purposes of extinction.

It was hoped that the carbon dioxide being heavier than air would not only not escape but would allow no outside air to enter, but it was found necessary to tamp all the crevices along the crop thoroughly and even then the mine was at no time under positive pressure, and the pressure was consistently negative till the crop crevices had been sealed despite the fact that liquid dioxide was being discharged into the mine.

Mr. Duncan declared also that at the time the mine was reopened a large fire area existed at both of the locations where the fire had developed prior to the sealing, that there was 225 feet of fire near one of the stations at No. 1 Butt where liquid carbon dioxide had been fed into the mine and that the roof had fallen to a height of 7 or 8 feet.

He also claimed from No. 1 Butt to No. 6 Butt on the airway and main haulageway there was no indication of fire, that the wood brattices and wood trolley-wire protection was intact and showed no evidence of flame. He added that a 16-inch borehole in No. 6 Butt, where much liquid carbon dioxide was used, fire was found within 70 feet of the borehole, this burning material being later wetted down by water from a hose and loaded out.

Before reopening the mine a pumping station fitted with one 300-gallon pump and one having a capacity of 600 gallons per minute was installed at the creek which runs at some distance from the main entrance to the mine, and carries much water discharged from adjoining mines. A booster pump also was installed on the main water line. This pump was at the summit between the reservoir and the mine.

THREE SHIFTS OF FIRE FIGHTERS

Mr. Duncan said that since the mine was reopened and until a few weeks ago three shifts were employed in fighting the fire, twelve men on each shift, two being apparatus men who were held in reserve. Eight lines of hose under a pressure of 60 to 100 pounds were employed constantly, the nozzles having a half-inch opening.

In each shift, the gangs loaded on an average fourteen cars, each of 50-bushel capacity, the load consisting of rock, slate, etc. Lately, in the latter part of September, the gangs were cut to eight men per shift.

In general until the middle of September, 1923, 36 men were employed loading out material. At present six lines of hose are being used and 40 men are clearing the mine. The rate of loading varied from 42 to 120 cars of 50-bushel capacity per day of 24 hours. Sometimes the temperature of the floor when the men were working was 110 deg. Fahr., and the roof where falls had occurred was 194 deg. Fahr. Of course at such points the men worked only for short periods.

The manway on the south side to No. 3 Butt and all the kick-back section, Mr. Duncan said, had not yet been reclaimed and is still an active fire area. In the dip section the fire is probably extinguished, for a dam in this area shows 12 feet of water. Oxygen apparatus were used wherever safety lamps would not burn and in all other operations all-service gas masks were used when necessary.

Summing up Mr. Duncan said that at No. 1 gas station was 300 feet of fire, that at No. 2 gas station no fire was evident before or after, that at No. 3 gas station wood brattices, trolley boards and other combustible bodies were still intact, that at No. 4 gas station fire was found within 100 feet of the borehole, and 4 feet of coke along the side of the rib in the manway and that at No. 5 gas station was 400 feet of fire along an old crop gob near the crop haulage to No. 1 room. Of this 200 feet has been loaded out.

Mr. Duncan quoted Mr. Silas Hall, district mine inspector as saying that there was more fire in the Bitner mine after sealing and the use of carbon dioxide than before sealing and that the liquid carbon dioxide did not extinguish the fire.

Mr. Duncan added that the entire cost of sealing the fire to date was quite large and that the company had made its heroic efforts in order to prevent its spread to other mines. Fires had been extinguished by sealing at the following mines of the H. C. Frick Coke Co.: No. 2, Lemont, Youngstown, Standard, No. 2, Central, Continental No. 1 and Davidson, the latter having had two fires, one of which was sealed and the other flooded. At Edgewater, Colorado No. 3, Depue and Collier fires had been extinguished by watering with a hose and the loading out of heated material.

Mr. Duncan added that water was used before the application of carbon dioxide for flooding the dip section. He said that Joseph J. Walsh, the chief inspector of mines of Pennsylvania, was a great admirer of the flue-gas method of extinguishing mine fires. Mr. Duncan declared that at times when the gas was being distributed the water would plug up and had to be exploded, so as to get them off. Though this happened on several occasions no one was injured.

He questioned the value of the gas analyses and doubted seriously whether the maximum and minimum thermometers gave the normal temperatures of the five zones into which they were lowered. He did not

believe that the high water gages due to cooling of the sealed areas ever caused any such influx of air such as Mr. Jones described, for such unrelieved water gages were present at the Barrackville fire, in northern West Virginia.

THE ARGONAUT FIRE

Mr. Tillson mentioned the Argonaut fire in California and said carbon dioxide was used at that fire without satisfactory results, but that he was under the impression that in that instance legal considerations and injunctions prevented the sealing of the mine and the use of the gas for a long enough time for a profitable result even to be anticipated. He thought it might well be that at Bitner conditions were such that carbon dioxide did not get a satisfactory trial.

Mr. Jones replied to Mr. Duncan saying that he was not present at the inception of the fire but that investigation since the fire showed that it had spread so extensively that if there were several fires at first, they had become, before sealing, a single fire. He added that Mr. Duncan was correct in saying that the sealing of the crevices along the outcrop was soon found to be absolutely necessary for the control of the fire.

Some differences of opinion might exist as to which areas had been extinguished by carbon dioxide and which flooding, but the evidences were quite clear that in some places not reached at all by water the fire had been extinguished by carbon dioxide gas. In other places he held that carbon dioxide had done the work but others believed that the water was the extinguishing agent.

Certainly the water helped in the cooling. No one could deny that its presence reduced the temperatures materially. He declared that along the main haulage the fire had been extinguished by gas, but as he had not examined the airway adjacent he could not make any statement. He also said that in his belief the application of more carbon dioxide in some places where the presence of fire was indicated would have completely extinguished the fire. The practice of fire fighting with carbon dioxide is so new that probably the work would have been more effectually performed had the experience now available been possessed before the work was undertaken. As in many trials of a new method or device the technique required experience and actual practice to obtain the best results.

Mr. Jones explained that Mr. Duncan's interesting narrative describing conditions before carbon dioxide was applied and after carbon-dioxide application was stopped should some day be set down in a complete historical account, but had no direct bearing on the story of gas application. The facts were that on December 16, before gas was applied, the right side of the Bitner mine was sealed off and was in the words of some of those present "practically all afire."

On March 21, before the mine was opened, the maximum indicated temperature inside eleven stoppings and at the bottoms of bore holes near the center of the fire zone was 78° F. On March 27, the mine was

opened, and the coal was still more or less smoldering in spots, but by May the mine was producing coal. Much fire was later encountered during the summer, but this was so long after gas application had been stopped that this chapter of the story, in which so much material was wet down and loaded out, had no bearing whatever on the success or failure of the gas method.

As to Mr. Tillson's questions as to whether fire could be extinguished in actual fire-fighting practice by establishing an atmosphere containing less than five per cent of the oxygen, he could only say that where it was established for a whole month as proved by gas analyses the fire was entirely extinguished and was found to be out when the place was opened.

Mr. Tillson said that as Mr. George C. Hewitt was not present to offer his paper on "Maintaining Interest in Mine Safety" and as it appeared that the session was extending well beyond the time limit appointed the paper would not be read but would be made part of the proceedings. This paper therefore follows:

MAINTAINING INTEREST IN MINE SAFETY

GEORGE C. HEWITT, SUPERVISOR OF INDUSTRIAL INSURANCE AND HOSPITAL SERVICE, PACIFIC COAST COAL COMPANY, SEATTLE, WASHINGTON

Years ago when the Pacific Coast Coal Company was first formed and long before "Safety First" had become an industrial slogan, the officials of the company realized that, due to the steep pitches and narrow seams caused by the many faults and intrusions in the field which resulted in their having to confront many adverse working conditions, a concerted action on the part of the employees was necessary for the prevention of accidents. Although the effort made at that time would seem to us now to be rather feeble, one of the fundamentals of successful safety, discipline, at that early date impressed itself upon us. To a recognition of this factor we attribute much of our success. Discipline for the employer and employee alike was, and is, the cornerstone of our safety organization. It has always been the policy of the company to show the employees what can be accomplished by strict attention to accident prevention, and it is particularly impressed upon them that it is wholly essential that both the employer and employee realize that they have certain obligations to meet in order to make successful progress in the work and that for either to repudiate any portion of their duties would mean a failure of the whole scheme.

The development of the State Mining Code did much to bring about a closer co-operation on the part of the employee. The presence of the State Mine Inspector and his Deputies at frequent intervals at the mines and the thorough manner in which the workings were inspected for unsafe conditions and practices convinced the employees that their personal safety was not secondary to production. However, it was difficult to obtain the desired results due to the fact that only 25 per cent of the personnel was English-speaking people. The many nationalities, with

racial characteristics peculiar to each, made it difficult to bring about the degree of co-operation that is essential if the constant hazard of employment is to be combatted successfully.

In the Fall of 1921 the entire personnel of the workmen was changed and in January 1922 the plan of "Collective Bargaining" was adopted, Mine Councils were organized, and the Company realizing that safety is a most vital subject in the minds of workmen employed in a hazardous occupation, gave the sub-committee on safety a most prominent position in the new Council organizations. This committee naturally works in close harmony with the General Safety Committee maintained in accordance with the State mine laws.

In organizing the Mine Councils, accident prevention was incorporated as a part of our business. That is to say, we explained to our workmen that we did not approve of an occasional intense safety program where banners were flown and prizes given, as we felt that the temporary enthusiasm that is so easily roused in this manner was not lasting. We assured them that we believed it was entirely unnecessary to proceed along such lines in order to awaken in the minds of the men a realization that they must cooperate with their fellow workmen and their employer in order to safeguard their future health and happiness. In keeping with that declaration, our safety education has always followed a definite course beginning at the time of employment. This is systematically carried on as long as the workman remains in the service of the company.

A workman applying at our employment office is given a private interview. The interviewer is a man of long experience in coal mining in this particular district. This enables him readily to ascertain the capabilities of the applicant and gives him an opportunity to acquaint the applicant with the general policies of the Company relative to accident-prevention work. We find that the impressions made on the applicant in this manner are usually lasting and that although he cannot immediately appreciate all that the company and workmen are doing in their efforts to reduce accidents to a minimum, he at least knows that his hearty cooperation is expected and that his future success with the Company largely depends on his attitude towards its accident-prevention work.

PHYSICAL EXAMINATIONS

As the workman passes through the various phases of the employment routine the safety instructions given him become more explicit. During the physical examination, which is conducted by the Camp Surgeon, it is explained to the workman that the tests are not made solely for the purpose of eliminating such applicants as are found to be physically unfit, but also to determine whether the applicant is physically fit for the particular work he desires. Should there be found, during the examination, some physical impairment which would increase the natural hazard of the occupation, the camp surgeon would recommend a non-hazardous job.

Our past experiences and observations have proved to us that the doctor, while conducting the examination can outline to the applicant

briefly what can be accomplished by a workman in promoting safety if he has the right cooperative spirit. This short talk carries much weight and is more readily accepted and retained than if given under different circumstances. This perhaps is due to the fact the applicant is then in a more receptive mood, due to his natural desire to know just how good his physical condition really is. This, of course, means that the examination must be conducted in such a manner as to impress the applicant with its value and with the examiner's sincerity of purpose.

The workman, on being presented to the lamp room, may feel that he is entirely familiar with the operations of the safety lamp, nevertheless he is required to listen to certain rules regarding the care of it. The attendant explains to him the importance of the lamp being at all times in perfect condition and why it should be carefully examined for any oversight in assembling. If the slightest defect is found, the workman is instructed to change it for one that is in working condition.

The workman is also shown how he should adjust the position of the batteries of his portable electric lamp when working in different positions so as to prevent the battery solution from leaking due to faulty gaskets which at times escape the most daily inspection. Thereby he is guarded against superficial alkali burns which have been known to cause serious disabilities. The workman is made acquainted with the fact that vinegar if applied promptly as a re-agent, will neutralize the alkali and prevent serious burns.

From the lamp room the workman is taken to the dry house and there he is impressed with the necessity of complying with the rules of sanitation. Upon reporting to the foreman the workman's attention is called to the bulletin boards bearing safety messages pertinent to coal mining—safe and unsafe practices—and to other bulletin boards showing the minutes of the Mine and Central Councils and of the Safety Meetings. The foreman explains the various safety rulings, giving special instructions relative to the State Mining Laws.

We believe, however, that our best safety educational work is done at the working faces or wherever the workman's duties happen to be, whether underground or on the surface, as all officials in every capacity are constantly on the alert to correct dangerous practices that come to their attention no matter where they may be and to do this the moment they see them.

The work done in committees, it is true, does much to develop co-operation, but we have found that when a workman's attention is called to an unsafe practice directly by a supervisor, it is certain to have the desired effect. Our foreman and supervisors feel that they are personally responsible for the safety of the men under them. In due time the new man in the organization is notified to attend the Mine Safety meetings. The membership of our Safety Committee is 10 per cent of the total number of men employed. However, our meetings are held at a time when any workman can take advantage of the general invitation to be present.

The subjects under discussion are the usual mine safety problems, the discussions of accidents, the report of inspection committees and the study of the monthly report of accident statistics which show accumulative and a comparative figure of accidents at all mines for the current year. Monthly, and at the close of each year, the Safety Committee is given a complete report of its accidents and particular attention is called to their fundamental causes and their severity and frequency rates. With the assistance of the supervisors and Safety Committees, the superintendents outline a campaign for the current year in which they center their attack upon the accidents that occurred most frequently during the previous year.

ACCIDENT FREQUENCY RATE

During the year 1922, our Newcastle Mine had an accident frequency of 500 accidents per annum per 1,000 men employed. In analyzing the cause of accidents we found that 56 per cent of all the accidents occurring underground were classed under falls of face or pillar of coal, falls of roof, struck in the eye by flying coal, mine cars and locomotives, and that the accidents under these classifications caused 57 per cent of our time loss. A campaign was immediately inaugurated against these causes of accidents with the most gratifying results. The accident rate for the present year for that mine has fallen as low as 137 accidents per 1,000 men per annum and the accidents under the classifications of "Mine Cars and Locomotives" and "Falls of Face or Pillar of Coal" have almost entirely disappeared. A similar program in the other mines has brought about a most gratifying decrease in the number of accidents.

The training that is necessary to develop the proper efficiency in the mine-rescue and first-aid work covers a long period, and during that time our workmen are taught that the prevention of an accident is better than the cure. We have found that in every instance where a man has been identified with either the first-aid or mine-rescue work, he has learned to realize the importance of being cautious in the performance of his daily duties. In maintaining interest in mine-rescue and first-aid work it has been the policy of the Company to hold annual intra-company meets in which much interest is dispalyed.

The Black Diamond team, winner of our 1923 meet, competed in the International Meet held at Salt Lake City and was awarded third prize in the combination First-Aid and Mine-Rescue work. We believe much of our progress in the accident prevention during the past two years can be attributed to the fact that in changing our personnel in 1921, our policy demanded that no man be employed unless he could understand and speak English. A recent census shows that 95 per cent of our employees are American citizens or have declared their intentions of accepting naturalization. This has eliminated many obstacles such as racial prejudices, which in the past presented an insurmountable barrier to any safety program we then launched. Our intense Americanization program is carried on at all mines for ten months out of the year, and as in all other phases of our personnel work the subject of safety is

given a prominent place. The students in the classes of Americanization absorb the safety idea with other fundamentals that go to make up good citizens.

The Boy Scouts at our camps are given practical demonstrations in first-aid and rescue work not only by the Scout Master but by men closely identified with the safety movement in this section of the State. Through the medium of our Company paper, the *Pacific Coast Bulletin*, published and distributed to the employees free each week, a distinct program of safety propaganda is being carried on. Many of the articles are written for the express purpose of appealing to the wives and families of our workmen. This weekly paper, we believe, is one of our greatest assets for the promulgation of safety.

The coal-mining industry owes much to the U. S. Bureau of Mines. Through the tireless efforts in research and education by the men identified with it, the mine operators and workmen have been taught how to prevent accidents, and it is our belief that the time is not far distant when coal mining in this country will not be coupled with terrible disasters and frightful injuries.

MAINTAINING SAFETY INTEREST AMONG SHIFT BOSSES AND FOREMEN

THOMAS COWPERTHWAYTE, SAFETY ENGINEER, CALUMET AND ARIZONA MINING
COMPANY, WARREN, ARIZONA

Eight years ago when I started the work of accident prevention all I could hear from those who had become interested in this endeavor was co-operation. I well knew that co-operation was necessary but how could I get it when 80 per cent of the foremen and shift bosses laughed at, or criticized, safety organizations?

After a short study of this unfortunate situation I was satisfied that with the unlimited co-operation of our management and superintendent I could demand results from the foremen ultimately even if they did not co-operate cheerfully from the beginning.

Our general manager gave a banquet inviting all foremen, shift bosses and heads of departments and at this banquet a solid foundation for our safety work was laid.

I could not at that time, nor do I at this time, see any great advantage in a central safety committee in underground mining. It is true that at many kinds of plants a central safety committee is of value to the safety organization, especially during the infancy of the plant, for various dangerous places can be discovered and their dangers reduced by those who have had experience in this class of work.

Even after all the safety appliances have been introduced and your plant is apparently foolproof accidents still occur. The question is "How can these accidents be prevented?" The most satisfactory and efficient means left is through your foremen and bosses. On these men, if competent and capable as foremen and shift bosses should be, the safety department must depend to prevent accidents. The safety inspectors (who

should have a sound knowledge of mining and judgment in handling various kinds of ground) can greatly aid the bosses in teaching the workmen various safety methods. They must make rules for them, for rules are essential in all safety engineering, and they must keep the safety movement before the foremen, bosses and workmen or all their past and initial energy will prove a failure.

As a rule the shift boss visits the places on his run twice each day, but the safety inspector can visit each place possibly only once in every two weeks or even only once a month depending on the territory he has to cover. Therefore upon the shift boss we must depend finally to have things kept in proper shape and to help in the instruction of his workmen as to the way in which it shall be done. If he takes the proper interest in safety work he demands that one cardinal safety rule be unerringly obeyed and that is, "Make your working place safe before anything else is done." A large percentage of our accidents happen at the working face owing to some slight neglect, and the only way to prevent them is to follow the rule I have just mentioned.

INTEREST MUST BE KEPT UP

We will assume that the shift bosses have been interested in preventing their men from being injured. As a result the safety inspector is getting satisfactory accident records and begins to pay little attention to what is being done. What will be the result? The shift bosses will lose interest, the men will be left to resume their bad habits, and within three months his safety work will be neglected entirely and if he gets good results they will come from good luck and not from good judgment.

It is absolutely essential that the shift boss and foreman be kept interested in the work and help in every way possible. The old saying is "Money talks" and in most cases if a man is properly compensated for his extra energies he contrives to get results—if that is possible.

To create and retain interest I use various methods and these have hitherto proved satisfactory. (1) A bonus of \$100 is paid to the shift foreman having the best yearly record.

(2) A bonus of \$30 is paid to any shift boss who can handle 2,500 men-shifts without an injury severe enough to cause any of his workmen to lay off more than one day. As an example, a shift boss who has charge of 50 men, who work 50 shifts without an accident causing them to lose more than one shift is given a \$30 bonus. This system has worked most satisfactorily since its adoption seven years ago.

Many engineers have inquired of me why a single shift layoff is not debited against the shift boss' record in awarding the bonus. This is done solely to create and sustain the interest of the shift boss. Many men who receive only a slight injury lay off not because of the accident but to take a rest. In fact under the present condition when our turnover is large, the shift bosses should be allowed consideration where men are not away more than three days, for a new man who

pinches or scratches his finger may lay off because his muscles are sore and not because he has been injured. So long as the shift bosses have a chance to win this money many of them will look up the men themselves and influence them to return to work. This goes to show the value of the bonus and the interest they take in it.

(3) All shift bosses and foremen are kept in competition with each other and a monthly report issued to each of them showing his standing for the month in question, and also his standing to date for the year. Percentages are figured on a 1000-shift basis, and 25 points deducted for a fatal accident if caused through neglect of the shift boss or foreman. Twelve points are deducted if the fatality is caused by the carelessness of the employee. Six points are deducted for any serious accident and one point for a minor accident. No-time-off accidents are not figured directly against the shift boss or foreman but are figured against the mine in the monthly report of total accident per 1000-shifts worked.

THE COMPETITIVE SYSTEM

This competitive system has proved very valuable, especially in reducing the number of accidents of a serious nature. As six points are deducted for each serious accident, the shift boss must prevent them or spoil his record. I have often heard them call up the doctor and inquire why a certain man is not ready to return to work and ask how many days it will be before the workman can return to his working place. I often find it best to see the doctor myself, for it is one way of helping the shift boss maintain his safety interest.

(4) I always follow the shift boss when making my inspection trips and try to show him where conditions can possibly be bettered. I never discuss anything with the foreman if the shift boss can remedy the condition himself, thus preventing hard feelings between foremen and shift bosses. If the shift boss has no authority to do what I desire I then discuss the matter with the foreman. However, if I find the shift boss is really not properly supervising the safety of the men I let the foreman know it.

After safety engineering has been instituted for some time and serious accidents have been reduced about 60 per cent below the old standard the safety engineer has to put on his thinking cap and has to devise new safety measures in order to continue the reduction. My data at the present time show that a large percentage of accidents happen at the working face and that these are principally the more serious ones.

They are usually due to oversight or carelessness of the workman and often happen before the shift boss examines the place of work. In these cases the safety engineer must depend on the carefulness of the miner or mucker and something must be done to keep these accidents to a minimum. To fulfill a part of this difficult task I post rules at every conspicuous place in the mines, stating the most essential things to be done every morning and afternoon in order to prevent injury.

Wednesday is the day chosen for these conferences. The notices are sent to the person in charge of this man, and he delivers one of them to the workman in person. The notice used to inform him of the meeting is in the form of a perforated double card.

"You are requested to report and present this card at the library on Wednesday afternoon at o'clock. This is important. Do not fail to report." This notice is signed by the general manager.

On the lower half of the card appear the following:

This is to certify that Mr.No.has been instructed as to the policy of this company pertaining to safety and first aid. To assist in preventing accident you are requested to help him start right.

Each morning I go down where the shift bosses are gathering their men together and make a short talk to them so that they will understand what new employees should be told when they arrive.

When the cards are presented at the meeting the bottom half is filled out, torn off and replaced in the envelope. The new employee is told to return it to the man for whom he is working when he returns to work on the following shift. The top half is kept by the inspector and filed.

When the cards are filled out to send to the new employees a list is also being made with their names and numbers on another sheet and checked when presented to the meeting, so that those in charge may be notified of anyone who failed to attend.

SAFETY AND FIRST AID TAUGHT

The object of these meetings is to call the attention of the men at the very start to the policy of the company as to safety and first aid. These instructions consist of a comparison of our accident statistics for several years at the beginning of our safety work and for the same number of years of a later date, a setting forth of the need for the men educating themselves in the practice of safety, admonitions to the effect that they must inform the men in charge about any hazards which the workmen exposed to the danger, are not authorized to correct, counsel to them to be careful of the safety of their fellow workmen, citing some serious or fatal injury due to the neglect or thoughtlessness of some other person, a suggestion that if it is worth while for the company to use means to decrease injuries, it is surely more important to the workman to go out of his way to guard his own body from them.

It is urged at the meeting that if every person will take the same interest to avoid injuries as they do to assist the injured the plant would be much safer and that safety is the best and cheapest form of insurance for the workman.

After the new employee has attended one of these meetings it becomes the duty of those in charge to teach him to perform his work in as systematic and careful a manner as possible and to warn him whenever he leaves his working place in a dangerous condition. With the continual vigilance of those in charge, the men soon become familiar with the policy of the company and realize that it is gospel.

This stimulation is maintained by regular inspection and by meetings of the safety committee, which are held each month. The surface works have a workmen's committee consisting of six workmen from different departments who are given one day each to make an inspection of all the surface departments and to make a report to the central committee of the conditions found, with any safety suggestions and recommendations it wishes to make.

The surface central committee consisting of the superintendents, foremen and bosses, who have a meeting each month to act on the report of the workman's committee, to discuss the accidents of the previous month and any other business that may be brought before the meeting.

The underground workings have a joint committee, consisting of one foreman, one shift boss and three workmen, which makes an inspection of the mine for two days during each month and makes a report to the superintendent of the conditions found with its recommendations for their amendments. At first it was thought that this committee would not accomplish much because the workmen would be little disposed to express themselves freely in the presence of the foremen and shift bosses. The committee has been in existence for six months and has proved to be very successful.

Before starting on an inspection with new workmen an explanation of the purpose of the trip is made and they are asked to express themselves about everything relating to safety just as freely as if the committee consisted solely of workmen. In a short time every one is discussing safety apparently forgetting the distinction of position. The inspections serve to stimulate the interest of all the members of the committee in the safety movement. The term of this committee is two months for foremen, one month for shift bosses and three months for workmen. At the expiration of each term new members are chosen by the workmen of the retiring committees.

The mine superintendent calls a meeting of the mine foreman and shift bosses once a month, which is conducted on the same lines as that of the surface central committee.

When starting the lectures for the new men, it was thought well to inform every one working at that time of the policy of the company. Consequently each shift boss got his men in a group on different mornings after going underground but before going to their working places.

The first meeting for new men was held in the library March 1, 1922, and up to March 14, 1923, the attendance had been 964. In that time the observations from the men had been most encouraging.

Mr. Tillson said that during the past year the Mining Section of the National Safety Council had attempted "to take stock" as to what it was accomplishing and should accomplish. He called the members' attention to the fact that the organization is a co-operative body and not one organized for profit. Its results were dependent on what the members gave not only at the meetings but throughout the year. Too many were prone to forget that fact.

They were apt to be critical of the efforts made for their advantage and did not stop to consider how little they might have done to help the organization to do the work they desired to be done.

The Mining Section had sent out questionnaires to all members asking a number of specific questions in regard to the service being rendered and another questionnaire to a group of mine operators, 78 in all, which dealt specifically with visits which Mr. Colburn had made to their properties, inquiring how effective they had been and as to the manner in which the service he had rendered could be improved and how much they appreciated what had been done. From those 78 companies, only 32 replies had been received, which showed how difficult it was to attack this problem by correspondence.

Of the thirty-two who replied, twenty said that they were pleased to have visits but said they could not itemize any specific benefits received. One was noncommittal and two stated that they had never received such a visit. Apparently these two had forgotten, or did not know, he was there. The great distances that the safety engineer had to travel handicapped him in his work.

From the first questionnaire which went to the entire membership only thirteen replies were received. A summary of these replies follows:

SUMMARY OF REPLIES TO CHAIRMAN TILLSON'S LETTER ON MINING SECTION SERVICE

The first question referred to the Mining Section bulletin service. The answers expressed general approval, with a few minor suggestions. The second question, referring to the general safety bulletins published by the Council, brought forth the fact that many mining companies are making very good use of these general bulletins as well as the sectional series.

In answer to the third question, the special mining safety articles which have been appearing in the *National Safety News* were generally approved. In answer to the next question it was stated that this magazine is generally used to keep up the safety interest of the operating force. Most of the members replying to question five also expressed approval of the Safe Practice pamphlets.

Perhaps the most striking result of the questionnaire was contained in the answers to the inquiry regarding the regional conferences. The members replying expressed hearty approval of these conferences and wanted to have them continued and extended.

Mr. Tillson said in comment that the suggestion from the Pittsburgh Steel Company as to the printing of the bulletins in English was one that had been received from many sources by the National Safety Council and had been carefully considered by the Executive Committee, which had decided that the greatest need in this country was to naturalize foreigners and to this end it was necessary to teach them to read American. He called on Mr. C. L. Colburn to make his report. Mr. Colburn said

his communication was made without a knowledge of what the letters contained and before he had any idea that he would be called during the present year to execute any of the policies he had advocated.

MINE SAFETY AND THE NATIONAL SAFETY COUNCIL

C. LORIMER COLBURN, U. S. BUREAU OF MINES, WASHINGTON, D. C.

The National Safety Council, being the one outstanding association devoted to the prevention of accidents in all walks of life, is intensely interested in mine accident prevention work. Many of the mining companies are members of the National Safety Council, and as such are directing the work of the Mining Section.

It is fitting and proper at certain times for an organization to analyze its activities to see if it is improving its opportunities and accomplishing its purpose. The interest of the Mining Section in safety is different from that of any other section of the Council. That is true, not only because mining accidents are different, but also because laws regarding mine safety are more exacting, and because there are more agencies working on accident problems in mining than in any other industry.

In 1910, following a series of serious mine disasters in the United States, the Bureau of Mines was organized with the express purpose of studying the reasons for mining accidents and for devising ways and means for their prevention. By the organization of the Bureau of Mines the Government has taken a hand in the problem and is doing splendid work that should be encouraged. It is one of the functions, therefore, of the Mining Section of the National Safety Council not to try to duplicate the work of the Government, but to see that the fullest advantage is taken of Governmental activity.

The Mining Section should also be co-operating with the Bureau of Mines to see that its efforts are directed along lines of greatest need; likewise the Mining Section should keep in touch with the various states through their industrial commissions, rating bureaus, inspection, and mining departments. The aim should always be to bring out the best thought on mine safety and to be progressive in applying practical safety ideas to mining.

On account of the extent of state and federal activity, the Mining Section should be particularly alert to see that only practical and constructive laws and regulations are passed and to prevent the adoption of laws or regulations that are detrimental to the proper development of safety in mining. The Mining Section should also co-operate with other agencies such as insurance companies, other safety societies, etc., in developing mining safety to its greatest extent. With so many varying activities, mine safety should be in the lead.

The Mining Section is in a commanding position, and with the variety of facilities at its disposal, should make mining the leading industry in accident prevention. This can only be done with the hearty co-operation of the mining companies. More company officials should be present at conferences such as this. Satisfactory reductions have not been made

in mine accidents largely on account of the lack of endeavor on the part of the mining companies themselves. At the present time the greatest and most lasting service that can be done by the National Safety Council for the advancement of safety in the mining industry is to secure the unstinted support of the mining industry itself.

Unlike any other industry, mining may be considered a group of small industries. One reason, therefore, for the lack of understanding and co-operation on the part of the mining companies, is their diversity of interests. In the transportation industry, one can readily see that there is a degree of similarity between the operations of, for instance, the class A railroads. In fact, we might take an extreme case and say that there are many things in common between the safety conditions of steam and electric railroads. Now compare metal mining with coal mining. The metal miners talk a different language, have different customs and are subject to different industrial requirements. Anthracite coal mining and bituminous coal mining are as different as two industries. The only similarity is that their product is coal. It is difficult therefore, for mining men of various interests to sit around a table and do conclusive thinking regarding mine-accident problems. In spite of these differences, mine-accident problems are considered alike by the public, by the law-makers, and by the courts. It behooves mining men, therefore, to act together. To bring this about is the function of the Mining Section.

THE VALUABLE SERVICE OF THE COUNCIL

The National Safety Council, operating through its Mining Section, is already giving the mining industry valuable service. This service can, of course, be improved, but the one discouraging fact is that the service is not appreciated by many of the mining companies. An active campaign should be inaugurated that would enlist the co-operation of every mining company doing business in America.

At the present time the bulletin service is considered of most value, yet it is almost impossible to print a mining bulletin that is equally good for all mining members. Most of the bulletins are of use to comparatively few. The bulletin service can be improved by increasing the number of mining bulletins so that each kind of mining would have its accident problems covered by the bulletin service. This may be due to the fact that so many other concerns are now selling bulletins and other bulletins that detract from the mine-safety bulletin service. To combat this development, it behooves the Council to give more study and thought to the preparation of mine safety bulletins and their distribution.

Another activity that is of prime importance in the development of mine safety, and that has barely been begun by the Council, is the holding of sectional safety conferences. The conferences held in Duluth for the Lake Superior district; in Butte, Montana, for the Northwest, and in Globe, Arizona, for the Southwest, all had a beneficial bearing on accident prevention in these districts. This work should be extended until every kind of mining and every mining section is reached by mine safety conferences. The transactions of these meetings should be pre-

the schools was the solution of the problem. If safety was imbued in the child from the start he would continue to practice safety when he entered industrial life.

Mr. Tillson asked Mr. Trestrail whether any high-school graduates entered the mines, and Mr. Trestrail said they did in various capacities. Mr. Tillson suggested that the mines were in general recruited with more primitive labor, and Mr. Trestrail replied that whether the children did eventually enter the mines or did not, the education in safety had another and more rapid result, for they went home and passed their training over to the fathers by recounting what they had been taught and in the language the parent understood.

Mr. Tillson asked whether the safety calendar had been efficacious in promoting safety and added that it was advertising. If you see something on a billboard for three years the sales go up; when a company ceases to advertise people forget, and sales go down. He added that the big problem was to sell the chief executives on the value of safety. Mr. Trestrail replied, "How many of the men coming out of the colleges to take positions in executive fields have been schooled in safety?"

Mr. Duncan said that in regard to safety education in the State of Pennsylvania a co-operative agreement had been made by the Pennsylvania State College, a state institution, with the Department of Mines and the Department of Public Education, whereby mining is taught by paid instructors as part of the public-school system. The associated interests have a curriculum suited to children that outlined sixty experiments in ventilation that could be conducted at home and with limited material. Though the time of training is short so that much is omitted that should be taught, safety material is by no means curtailed in this instruction. The association has sixty primary lessons in mining for beginners in the study, and another group of lessons reaching a higher grade and fitting men for foremanship.

Mr. Hall remarked that the coal-mining industry had the advantage that the mine foreman had to pass an examination before being admitted to that office, but that the character of the questions had not been sufficiently revised for many years and that safety had not been given the place it deserved in those examinations.

Mr. Tillson said that the Council had courses for foremen in many cities in which safety practices were taught. He said that it had not furnished such classes in the Mining Section because the mines were so greatly scattered that such instruction could be provided only with difficulty. There were, however, regions where such schools could be held and it would be advantageous if the Mining Section were to prepare leaflets for that purpose. Mr. Duncan said that the association of departments he had mentioned had such practice pamphlets and that ten thousand men in Pennsylvania were studying mining with the aid of the courses it supplied. Mr. Tillson said he hoped Mr. Hall would form a committee to study this problem.

ADJOURNMENT.

Packers' and Tanners' Section

October 3 and 4, 1923

J. M. EATON, Chairman

Safety Department, Libby, McNeill & Libby, Chicago, Ill.

W. L. McCLELLAN, Vice Chairman

Safety Supervisor, Armour & Company, Chicago, Ill.

HAROLD F. NORTH, Secretary

Industrial Relations Department, Swift & Company, Chicago, Ill.

WEDNESDAY MORNING SESSION

CHAIRMAN EATON: We will open our session on time regardless of the number of the audience. I appoint Mr. A. B. Drummond, Mr. George R. Keenè and Mr. Oliver Cromwell as members of the nominating committee.

We will expect their report the first thing tomorrow morning.

SAFETY IN THE PACKING INDUSTRY

R. M. MEEHAN, ASSISTANT PLANT ENGINEER, JACOB DOLD PACKING COMPANY, BUFFALO, N. Y.

I believe that safety in the packing industry is not different from safety in any other industry; no matter what you do or where you work, you have to be careful. Of course we have certain hazards which are peculiar to our industry. I would class as most frequent, knife cuts, slipping, falling and tripping, falling objects and infections. Infections are usually the result of some previous injury.

Over a period of six months I compiled a list of knife cuts which we had. There were 440 cases of hand injuries, and 349 were knife cuts and I believe that only about 25 per cent of the employees in our industry use the knife in their work. That looked to me like a peculiar condition. Inasmuch as we employ 100 men in our plant, that would mean that perhaps 300 to 350 are using knives, and yet 349 out of 440 hand injuries were knife cuts.

Next, we have found that slipping, falling and tripping, principally slipping on floors which are naturally wet and greasy, were the most frequent accidents. I notice that other addresses are to follow on falls in the packing industry. I found, in going over our records, that perhaps falling, outside of knife cuts, was the most frequent hazard. I found

that for this year, from January 1 to this time, we have had 16 major accidents in slipping, while knife cuts were only 12 that involved lost time. Often we find that they fall because they are not supplied with the proper lighting facilities. I believe that the burning out of fuses is more prevalent in the packing industry because of the continual wet conditions we have.

Another class of accidents is caused by falling objects. Most of these cases do not result in lost time injuries, yet once in a while a man is working with a knife in his hand and a hog drops from the rail, and there is grave danger there. One way to prevent that, of course, is to provide proper inspection of the hog rollers.

Infections, of course, are another class. They depend on the way that you educate your employees to pay attention to the injuries they get so that they will report for First Aid attention, and even then they will get infections, in spite of every thing that can be done.

IMPORTANCE OF THE FOREMAN

I believe that the preventing of these accidents could be affected best by the foreman. A man was injured through the agency of one of our foremen, yet he had not reported this accident; nobody knew that it had happened. It had happened on overtime and nobody was present but the foreman and the man himself. When we found out about it we looked the man up immediately. He was staying at a rooming house, where he got no attention, and we removed him at once to a hospital and had a doctor examine him. We found that the man had a fractured ankle—two weeks after the accident occurred. That is the foreman that I call a very bad type, from a safety standpoint.

Another type we have is the one who called me up on the phone. We had been killing kosher cattle and he said: "Bob, you know this butcher up here that kills kosher cattle?" I said yes, that I did. "Well a steer kicked him and he has a bad cut, but he won't come down to the First Aid." I said, "Tell him either he will have to come down to the First Aid or he can't kill any more cattle." And in less than five minutes the doctor had taken four stitches in his chin to get him fixed up.

That foreman is a good type. He always watches his men; he doesn't let two men work on one carcass at one time because there is danger.

Use safety treads on the stairs so there is no danger of slipping. You must use some method to educate the workmen to be careful.

I believe the prime thing in safety, not only in the packing industry but in any other industry, is to *teach the man to think for himself*. That is a long process, but I believe that is the only solution.

DISCUSSION

Mr. G. R. Keene (Swift & Co., Chicago): What kind of a knife guard do you use?

Mr. Meehan: I have recently tried to make a knife guard. I brought a few with me. I don't know what you gentlemen think of them. I have here about half a dozen aluminum knife guards. In fact, I brought

a six-inch butcher knife with me that has one of these guards attached. I haven't had much success in getting the men to use them. I have one man who got four cuts in a period of six weeks and he finally agreed that he had better use something like that.

(Passes knife with guard around for inspection.) On our beef killing floor there isn't a single man who doesn't carry a knife pouch, but on the hog killing floor I cannot get them to use it. I have tried to get a general order through to require every man to carry a pouch.

Our hog killing floor, in practically every case, is on the top floor and our dressing room is on the ground floor. You can go to the dressing room and find men walking up and down those stairs with knives in their hands. It seems impossible to convince people that are responsible, that that is a dangerous thing to do. They admit that if a man fell or ran into someone, a serious accident would occur, and I am afraid I will have to let it go until such an accident does occur in order to convince them.

Mr. Keene: That is a matter of education. I believe the hog butchers will not carry a pouch because they use only one knife, while the beef butchers use half a dozen knives and must have a place to carry them.

Chairman Eaton: We have not only men on the cutting floor in the Chicago plant who carry these various knives, and all have pouches, but we have women operators in California who use sharp knives in our fruit canneries, and we have had a couple of very serious accidents due to girls carrying their knives in their hands when they go to the wash room. We have issued a rule now that the girls may not leave the operating table with a knife. They must leave the knife at the table, and we have furnished them special pouches at these tables to stick these knives in at each particular location. Of course you can't do that with a cutting floor man; he would laugh at you.

I understand that Mr. Patten of the Pierce-Arrow Company will not be with us, but he has sent Mr. J. M. Farmer of the same Company and Mr. Farmer will present Mr. Patten's paper.

SAFE OPERATION OF MOTOR TRUCKS

ROBERT O. PATTEN, THE PIERCE-ARROW MOTOR CAR COMPANY, BUFFALO, N. Y.

Perhaps it might not be amiss for me to give you gentlemen a bit of recent history as to what has been going on among the crusaders in behalf of prevention of accidents with motor vehicles. The subject is so tremendously vital that it has been given international attention and study as you well know. Our state highway commission, police departments, and other public service bodies are keenly alive to the situation.

It may surprise you to know that the motor truck has not caused anywhere near the havoc of the passenger car. This may possibly be explained by the greater number of passenger cars being operated, the slower relative speed of the motor truck, and the higher percentage of daylight operation of the motor truck. But referring to the State of Connecticut records, we find illuminating figures based upon thorough investigation of the cause and effect of each accident.

Statistics of Motor Vehicle Accidents

Cars	72%
Trucks	26%
Motor Cycles	2%
	100%

Causes of Accidents

Motor Vehicle Operation	81.0%
Carelessness of others	15.0%
Defective vehicle equipment	3.5%
Miscellaneous	0.5%
	100.0%

Accidents Account Motor Vehicle Operation

Carelessness	37 percent of group	30.0 percent of total
Failure to give right-of-way	21 percent of group	17.0 percent of total
Reckless driving	19 percent of group	15.4 percent of total
Loss of control	8 percent of group	6.5 percent of total
Wrong side of road	4 percent of group	3.2 percent of total
Skidding	3 percent of group	2.4 percent of total
Poor judgment	3 percent of group	2.4 percent of total
Failure to signal	2 percent of group	1.7 percent of total
Miscellaneous	3 percent of group	2.4 percent of total

Accidents Account of Others

Pedestrians	73.0 percent of group	10.95 percent of total
Motormen	12.0 percent of group	1.80 percent of total
Bicycles	9.0 percent of group	1.45 percent of total
Teams	2.5 percent of group	0.38 percent of total
Dogs	2.5 percent of group	0.25 percent of total
Motor cycles	1.0 percent of group	0.17 percent of total

100.0 percent of group	15.0 percent of total
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Fixing responsibility for reckless driving, the truck driver is guilty of 9 percent of accidents against the passenger car, 91.0 percent; cutting-in, for trucks, 8.4 percent, passenger cars, 91.6 percent; failure to grant right-of-way, trucks, 11.5 percent, passenger cars, 88.5 percent; vision obscured, trucks, 2.7 percent and passenger cars, 97.3 percent.

Taking their experience for one year, Connecticut state highway officials render the verdict that 48 percent of all the accidents are due to intentional and deliberate violations of the law; 43 percent to unintentional careless violations, and the remainder, 9 percent, are classed as unavoidable, due to sudden deaths, epileptic fits and temporary blindness. But the report is startling in that it demonstrates 91 percent of all accidents might be eliminated.

In 1921 the State of New York reports that 1,981 persons were killed outright, and more than 40,000 seriously injured by motor vehicles. New York State has more than 780,000 passenger cars and more than 185,000 trucks, and the astonishing fact is that the greater proportion of both deaths and accidents occurred outside the City of New York. This is due to excellent handling of traffic conditions by police in intelligently and persistently educating the public in Safety precautions and enforcing the traffic laws. In 1921 New York City suffered 3,482 individual cases of disaster—1,054 of those killed being under 15 years of age. Police of New York have declared they can and will eliminate 50 percent of the automobile accidents by educational measures to both the motor vehicle user and the public at large.

COMPARISON OF AUTO FATALITY STATISTICS

With your further permission I want to continue this picture to emphasize the seriousness of the situation and to show you how some cities have, by eternal vigilance, improved their local conditions. In St. Louis, in 1917, there were 47 killed per 10,000 vehicles in services, and in 1921 this was reduced to 14 fatalities per 10,000 vehicles. Milwaukee is another glowing example of work being well done. In 1919 there were 320 persons killed in accidents and in 1921 only 263, and the number per 10,000 automobiles was reduced from 25 in 1919 to only 12 in 1921—actually cut in half in the short space of two years. The City of Detroit has traffic congestion not equalled anywhere outside the City of New York. By constructive and continuous safety efforts, fatal accidents were reduced from 240 in 1920 to only 134 in 1921—50 percent reduction in fatalities with an increase of 25 percent in the number of vehicles put in service. Next time you are in Detroit look around and take the lesson home with you.

In completing what has occurred in the past,, I want to give you an up-to-the minute summary, from which you may draw much encouragement in your efforts.

Year	Number auto deaths per car	Total number auto deaths	Cars registered	1,000 car pop.	10,000 car pop.
1917	.0019	9,184	5,104,321	48	.0887
1918	.0016	9,672	6,146,617	59	.0919
1919	.0013	9,827	7,530,105	71	.0936
1920	.00123	11,358	9,177,129	87	.1040
1921	.00119	12,500	10,464,005	99	.1100
1922	.00114	14,000	12,239,114	115	.1334

14,000 Automobile Fatalities in 1922

Now we come to what has been done and what can still be done to reduce the number of accidents. The manufacturer of the automobile and truck considers himself an important factor in this crusade and is working with might and main to help the cause. He, first of all, assures

the vehicle being adequately equipped with brakes that will hold, signaling devices that will sound warning, lighting apparatus that will light the way—all that, with common care in operation, human life may be safeguarded against accidents. The manufacturer strives to leave nothing undone to make his vehicle safe to operate, and makes it as fool-proof as possible.

Through the National Automobile Chamber of Commerce, essay contests have been conducted on ways to promote saner and safer traffic. These are conducted under the direction of the highway education board for the best lessons and essays by school teachers and pupils on the subject of Traffic Safety. Prizes are given—the first award usually being a trip to Washington and the prize is presented to the winner by the President of the United States in person.

While the automotive industry claims no direct credit, it gave the utmost encouragement and consideration to our leading colleges and universities which have adopted, as part of their curriculum, highway and traffic study.

Articles in the form of pamphlets are being continually written and broadly distributed. Recently, there was prepared "Common Sense on the Highway," which to date has had 315,700 requests. Some of our great corporations had this article placed in the hands of their employees, notable examples being the Standard Oil Company of New York, 14,500 copies; Aetna Life Insurance Company, 3,000 copies; the Texas Company, 650 copies; the New York Telephone Company, 770 copies. The automobile trade, through its dealers and clubs, newspapers and special publicity gave to this article an amazing circulation.

Whenever the opportunity presents itself, the automobile manufacturer, through the National Automobile Chamber of Commerce, supplies speakers, literature, etc., to carry the message of the necessity of safe and sane operation of the automobile to the public. Furthermore, we are continually working with the various legislative bodies in furnishing data in order that laws may be enacted that will be fundamentally sound, and at the same time not carry with them unreasonable penalties or taxation. Along these same lines we have been working for the uniform federal highway law, the value of which will be of almost untold benefit to the motorist and the public at large. You must realize that the automobile industry is keenly alert to the whole situation, and we want you gentlemen to be assured that we are doing our share of this great work.

And now I come to the most difficult point of my contribution to this Congress. It is rather embarrassing for me to suggest methods to a body of men who are devoting a great part of their lives to what I am supposed to tell them all about. Probably what I am going to suggest to you is nothing new, but good ideas bear repetition when they are carried out in the proper spirit. And in this connection I am going to assume that we are dealing with fleet operators rather than the individual user.

In my personal contact with packers and tanners, I have found they have two general complaints against the motor truck, viz., the motor

truck itself—and the driver of the truck, to which the motor truck industry can honestly reply that these are matters entirely within the range of the owner.

USE SAFE EQUIPMENT AND EDUCATE DRIVERS

Let us tackle the problem, by first considering the truck itself. Permit me to give you some frank and unbiased advice on this point.

When you use good safe equipment, your drivers know it just as well as you do. They have a certain respect for the truck and know it is up to them to be careful and do their work on schedule. They can rarely place the blame outside themselves, and you will find an entirely different attitude on the part of the driver for his truck and his job. And he will protect your investment better because he will have a certain amount of pride in working with good tools.

Much has been said about the driver, and most of the blame has been laid at his door. When all is said and done, however, we only want him to drive our trucks safely and economically. It is largely a matter of careful education, securing his interest and making him understand what we are trying to accomplish. I know a great many truck drivers and they are eager to learn and improve themselves in life, and I have seen many of them earn, by merit, splendid promotions. Too many employers treat their drivers as a piece of the truck itself rather than as a human being, and they get just a cold response.

Just a few more remarks about the driver. A good physical constitution is necessary for his work. Nervous, impatient, high-strung temperament have no place behind the steering wheel of a truck, these individuals being too prone to take their feelings out on the truck. Drivers must possess caution, dependability and judgment. Pick medium sized men, about 160 pounds, who have a natural smile that comes from the heart.

We all want to operate our trucks as safely and cheaply as we can, and must each determine ways and means to do this. Organize a drivers' club, with the drivers as officers—the executive spirit being the owner of the trucks. Outline the purpose of the club and base rewards on individual results. Then get the drivers together and carefully explain to them the situation with regard to accidents; that they are vitally interested themselves because the next victim may be their own wife or child; that the vast sums spent by you for advertising are largely for the purpose of building up good-will, which is destroyed by injuries to the public. After this platform is thoroughly understood and all pledged to work for its success, the next meeting should be a demand for safer driving on account of increased costs in insurance rates, delays in delivery, and excessive repair bills. Any carefully kept record will indicate high repair bills go hand in hand with accidents. Be frank in your statements that you want to cut down the number of accidents, primarily from a human standpoint, and also because it will save money for your business.

THE BONUS SYSTEM

Entering into this phase of the situation is the bonus system for drivers. Frankly, I am personally in favor of the bonus system when properly applied, and when a driver has cash at stake he is bound to be careful. Some of you are for the bonus system and others opposed, but it simply means rewarding the driver for efficient service by graduated sums of money proportionate to the value of the service rendered. Properly developed, it means increased profits for the owner and higher wages to the driver. The bonus system many times eliminates friction over wages and automatically fixes compensation to drivers.

The simpler the bonus system the better, and it is wise to consider only the fundamentals upon which to base the bonus. These should be the clearly understood factors of truck operating costs; tires, gasoline, oil and repairs. Don't set the objective mark too high, but assume conservative figures based on present averages and pay the bonus on the excess.

As a fundamental rule, state that no bonus will be paid to any driver who has an accident, for which he is responsible, within the bonus period. Suppose you are now averaging 10,000 miles on tires; 1,000 miles of fuel is the average monthly consumption, and that 10 gallons of oil per truck is being used. The bonus should be paid to the driver on the basis of whatever mileage he gets above the average figure, half of which should go to him. If the driver, by careful driving, is able to get 12,000 miles per tire, he should receive half of one quarter of the cost of a new tire. If a driver, instead of 1,000 gallons of fuel, gets through his appointed task on 900 gallons, he has earned half the cost of 100 gallons of gas. If he manages to get by on 9 gallons of oil, he has earned half the cost of a gallon. Repairs are more difficult and involved to handle, and the owner must have reliable figures on which to base his average, which should be on a mileage basis. This is the bonus system in its widest aspects, and should be modified to meet individual requirements.

By the organization of a drivers' club and the installation of some sort of a bonus system, you will make the driver feel a sense of ownership and responsibility for the performance of the truck, and you will not be carrying the whole load yourselves. When you have this driver's organization working for safety measures just as strong as you are, then real progress will result.

In conclusion I want to offer a few words of caution. Don't permit your trucks to be operated unless they are in safe condition for service. Never allow them to be seriously overloaded. Constantly impress upon your drivers they must never take a chance nor hesitate to stop.

DISCUSSION

Mr. Roy S. Bonsib (Standard Oil Company of New Jersey): I am very much interested in the truck operation. We operate about 4000 trucks. I want to back up Mr. Farmer's statement about raising the morale of the truck driver. We quit calling our drivers "truck drivers"; we call

them tank wagon salesmen, and that has given them more respect for themselves. We also try to impress upon them the importance of the position they occupy, both for their own sake and the sake of the company.

I think there is one mistake the operators of companies make, they don't impress upon the man the fundamentals when he is hired. They take it for granted when he is hired, that the man is experienced, and it is not necessary to go over some of the principle points.

There is one point that should be emphasized, and that is the importance of keeping brakes in good working order. The brake is the only means of protection that the man has.

The safe driving school is an excellent thing. So many truck drivers are familiar with their machines, but don't understand some of the fundamental principles of the machine's operation, and at that school you can go over some of the principles of the engine. It gives them greater respect for the truck and they take better care of it.

Mr. Bonsib: We have found this: there isn't a man alive that isn't interested in a machine. If he isn't interested in machines there is something wrong with him. It stands to reason that he is going to take an interest in the auxiliary parts of that machine. At least, I have never seen that fail. The psychology of that is absolutely infallible.

Chairman Eaton: There is a possibility of putting across this club idea without the bonus. Of course, I don't think the stockyard firms will favor a bonus, but they are putting through certain systems in the yards now that do favor a bonus. I think Swift's have it and we have it in Libby's.

Mr. Drummond: We used to have a bonus for tires, but we abandoned it about two and a half years ago. It didn't work out quite as successfully as we thought it would. There are several conditions which make it hard.

It is hard to say openly what was the main factor. We haven't any idea of being able to draw these fellows together into a club that would have very much of the social in it.

I haven't found that the men employed in a large organization are particularly keen on the fellow whom they work with all day. A fellow has his business associates and he has his social friends. I am rather wondering whether the social feature would have any value. You might be able to work out something from the standpoint of efficiency through a club of that sort, but unless your drivers are very large in number I don't believe you will get far on a club idea.

SECURING OF CO-OPERATION OF FOREMEN FOR SAFETY

J. M. EATON, SAFETY DEPARTMENT, LIBBY, MCNEILL & LIBBY, CHICAGO, ILL.

There are many kinds of foremen but all of them can be put into the following four classes, viz: (1) the young and ambitious foreman; (2) the middle-aged, self-sufficient, self-satisfied foreman; (3) the rough, aggressively belligerent foreman and (4) the efficient intelligent, humane leader.

In order to make this paper of any real value to the safety men I have endeavored to portray as near as possible facts gleaned from actual experience in obtaining the intelligent help of our foreman in the campaign for safety on our plants.

There have been many discouraging features in the past requiring patience and perseverance to overcome, and there very likely will be similar ones in the future, but the intelligent co-operation eventually obtained is ample reward for the enthusiastic safety man. When accidents are frequent and costly, your foreman, as well as your superintendent, will more than listen to you in hopes of some remedy for this condition, but when they are few and far between your difficulties begin for the reason that the executives apparently feel that every hazard has been taken care of, that all the men are constantly on the lookout for dangerous conditions, whereas as a rule it is because for a few days things are breaking right and every one is lucky. The safety man is then a nuisance and his suggestions are given indifferent attention. Overconfidence is apparent, followed by carelessness. Then come the accidents, and then you must be ready and willing to step into the breach and take advantage of every opportunity in which to impress the foremen with the necessity for ceaseless safety activities.

THE YOUNG AND AMBITIOUS FOREMAN

In your efforts to obtain the co-operation of the young and ambitious you will have to take into consideration his nationality, his usual lack of education if such is the case, the fact that in his own estimation he is a self-made man and, consequently, very proud of his job; also the fact that he has safety ideas of his own. You will find him willing to listen if the boss sends you to him, but if not, he may or may not pay much attention to you other than to say he is busy and will do something in the way of a safety guard or device as soon as he has time.

Only persistence on the part of the safety man combined with diplomacy will succeed in his case. If you use his ideas and give him credit for them and if he has in most cases worked his way up to his present position and is still looking for additional advancement prove to him that to get this advancement he must have modern ideas which means including safety work and finally convince him that this will tend to increase output.

Use your efforts to get him to serve voluntarily on the safety committee and after you have succeeded call on him as often as you can during such meetings for suggestions. I say voluntarily because any foreman ordered by his superior to serve on a safety committee, who has heretofore been indifferent to safety work, will make a poor committeeman and will be a liability instead of an asset to such a committee.

With the foreman of the second class who knows all there is to know about his job one has the most difficult task. He is skeptical of any suggestions unless made by the superintendent who must be one who has come up from the ranks to even be considered by such a foreman as really knowing anything about the business. This kind of foreman has to be

handled as you would handle no other. He is very touchy, and absolutely will not concede that any one knows anything about the handling of his job but himself. He knows the age and defects of every machine operated in this department and when it was installed; remembers almost every man who has operated it, every accident that ever happened and the cause; insists that if the operator uses his head and has ordinary intelligence and skill which he must have to work under him, he will not have any accidents. The only way you can convince him of the need of safety guards and the drilling of his men along safety lines is to get on the job yourself immediately after an accident in his department, and while he is still puzzling over the failure of his individual accident prevention system to work out as expected show him then and there how, by fool proof safeguards, that particular accident could have been prevented. He will resent your butting in even then, but you will find that he will not resent it openly and will at least make a pretense of listening to your suggestions. Don't antagonize him; suggest that you believe you can with his help and experience work up some kind of device that will help to prevent this kind of accident happening again and after he has grudgingly agreed to fix up something, keep after him until it has been installed. Thereafter, whenever you have an opportunity, mention this guard to other foremen as well as the superintendent. He, the foreman, will soon hear about it, as such things get around quickly. Wait a couple of weeks in the meantime and, as opportunity affords, drop into his department with others who are with you in this work and show them the guard, calling the foreman over and having him describe how it prevents the operator from getting hurt. By the end of the month, unless he is unusually stubborn and unresponsive to real and deserved praise you will have him with you enough so that you can get him to attend one of the safety talks and later volunteer to serve on the safety committee. Once he sees the light and realizes that to be an efficient foreman from a modern up-to-date standpoint, he must embrace safety as one of the essentials of successful operation he will be one of your best men because he is intelligent and not too old to learn new tricks and has ambition; otherwise he would not be at the head of an important department in a producing and money-making shop or factory.

HELPING CUT DOWN LABOR TURNOVER

The rough, aggressively belligerent foreman is nearly extinct; yet you will find them once in a while and invariably on account of being keen to get things done quickly, and ability to drive their men, they usually stand well with the superintendent. This kind of foreman as a rule has few dangerous hazards in his department as he is usually in charge of laborers, truckers, loading and unloading cars and his men are as hardened as he is. Once ever so often there will be an accident in this department and you have to deal with him, and the only way is to be firm and insistent on a thorough investigation as well as explanation.

If your belief in safety is backed up by aggressive and intelligent action he will go along with you and will do everything he can to make his men

see the same light, but if on account of his reputation you hesitate and try to handle him through the superintendent, you make a big mistake, as by this move on account of the man's characteristics, you have raised a wall of obstinancy on his part which will ever after be hard to scale.

However don't lose heart, for even this class of foreman can see the trend of the times and is usually sensible enough to realize that he will not better his chances for promotion by refusing to co-operate with you and will come around eventually. Study him carefully, if possible learn his hobbies if he has any and usually you will find that he is easily approached and will be very friendly if properly handled.

As a last appeal and a method of obtaining results when your efforts to get this kind of foreman to take more interest in safety matters seem fruitless, show him that by protecting his men from injury, he can cut down his labor turnover with consequent reduction of operating costs. He will soon realize that those under him, no matter how dense or indifferent they may seem, will very quickly respond to such efforts on his part by not being so ready to quit their jobs. The breaking in of new men in his endeavor to replace competent help that has quit on him is the nightmare of the average foreman, and anything that will help to keep his men on the job will appeal strongly to the foreman whose ambition is to hold down operating expense and at the same time increase efficient production.

The last and best kind of leader, the intelligent, humane and efficient foreman, the kind every superintendent is on the lookout for at all times, is found in every successfully operated manufacturing plant, and you will not only find him respected by all who work under him but also by the superintendent and his fellow foremen. He is your keystone, he you should cultivate. Go to him for advice; he will more than co-operate with you. His example will be followed by many who would otherwise ignore you and make your work doubly difficult. Make of him a real friend for he is the equal of any and all and his influence is felt in every department. He is for safety at all times and his department will show every evidence of his constant endeavor to prevent accidents. Make his office your constant stopping place and his advice your guide and you and your plant will be greatly benefited thereby.

I have in mind a foreman of ours who has been installing safety guards in our machines for many years, who originated his own safety guards for punch presses and has been inventing new ones whenever necessary to meet some specially hazardous condition and who has so instilled safety thoughts and ideas into those under him that they suggest new safety devices for their machines voluntarily, thus, many times, helping him to solve puzzling problems.

FOREMAN'S AUTHORITY SHOULD BE RESPECTED

Another important thing to remember at all times is that the foreman is usually a self made man in his line and is proud of his record, that he usually has hobbies and that it is to your advantage to show interest in the things he is interested in. That you are at all times really solicit-

ing his cooperation, not ordering it, and that you must keep your temper under control no matter what the provocation; and show a disposition to help him out of safety difficulties. This attitude on your part will get results.

After obtaining this cooperation the necessity of retaining it is constantly before you. We all know how quickly safety efforts on the part of the workmen slack up when the foreman is uninterested, or indifferent.

There is one important item which I want to make stick so that it will be uppermost in your thoughts when you run into a case where a foreman has been negligent, and where he deserves severe criticism not only on account of his deliberate indifference to safety precautions, but also on account of his stubborn attitude towards you. When dealing with him at such a time there is a possibility of his exploding into abuse and refusing to admit any fault. Therefore, if you are in his department, at the time, be sure to show due regard for the authority vested in his position and especially so while in the presence of his workmen. This doesn't mean that you are to be servile, but that as the foreman demands and has the respect of those working under him, there should be no loud criticism or condemnation of his safety shortcomings, no matter how justly deserved while you are in the presence of his help as such action tends to lessen their respect for him and his authority and will get you in bad with all concerned.

DISCUSSION

Delegate: Which way have you had better experience, in getting the foremen on the inspection committees or in using straight workmen on the inspection committees?

Chairman Eaton: Put the foreman on the safety committee and have the foreman select some workman from his department to assist the regular safety inspector on his inspection work—that is, to go over the department often during the week and report hazards or guards that are out of place to the safety inspector when he comes through that department.

In our plant we have just foremen on our safety committee. In some of our western plants we have both executive safety committees composed of foremen and the superintendent, and a workmen's committee. These workmen's committees meet every two weeks and the executive or foreman's committee meets once a month. The workmen's committee make their report to the executive or foreman's committee, go over their report giving suggestions and also discussing all accidents that have happened during the previous thirty days.

Mr. Drummond: There is no reason, if we have the foremen and workmen together on joint representative committees for the consideration of other matters, why we should restrict them from accident prevention committees.

Mr. Bonsib: Any company will find that the men themselves have more respect for their elected representatives on the safety committee than for any other person. We have our representatives elected by their fellow

employees to serve on the safety committee, and it brings splendid results.

Mr. John S. Marks (Security Mutual Casualty Company): One must not forget that certain insurance companies give credit for standard committees. Standard committees are fully explained in a small pamphlet called the "Hand Book of Safety Rules." In order to get this 10 per cent credit you must have an organization as outlined in that book.

While the results obtained from an organization or safety committee might be better than what the management feels they could obtain by an organization as explained in the book, they would not be given credit.

That form is divided into three classes, Class A, consisting of plants employing 1 to 50 men; Class B, consisting of 50 to 500 employees, and Class C is 500 and better.

Chairman Eaton: Doesn't the state regulation as to inspection apply?

Mr. Marks: Local regulations do, but it has been our experience that state regulations are not so exacting, so to speak. You have in mind factory inspections?

Chairman Eaton: I have in mind California.

Mr. Marks: California has a separate rating bureau and they will not accept a report, even though it may be more in detail that has not got the name of the California rating inspection bureau across the top in big letters. Local bureaus known as the rating and inspection bureaus which are operated under the jurisdiction of the insurance commission have in some instances, but very few, local rules. Standards are generally construed by all of them, as being standards. In other words there is, I believe, a slight difference in the rating between the New York standard and the Massachusetts standard at the present time, but there is a movement on foot now to make the standards in general rule.

THURSDAY MORNING SESSION

Chairman Eaton: The first order of business on our program this morning is the report of the nominating committee.

Mr. A. B. Drummond: Your nominating committee submits the following report:

Chairman: W. F. McClellan, Safety Supervisor, Armour & Company, Chicago.

Vice-Chairman—Tanners: F. Schwartz, Pfister-Vogel Leather Company, Milwaukee.

Vice-Chairman—Packers: A. B. Drummond, Wilson & Company, Chicago.

Secretary: Harold F. North, Swift & Company, Chicago.

(A motion to unanimously elect was seconded and carried)

REDUCING ACCIDENTS AND MINIMIZING INJURIES

A. B. DRUMMOND, WILSON & COMPANY, CHICAGO, ILL.

Quite naturally, if you are building a house or are on a construction job you lay out the definite plan so you can see your completed whole before the foundation is laid. We have a very complete system of records

that are kept up to date at all times. We handle the accident cause by dividing it into different headings and I am going to read you a list under the main heading. Of course, this is subdivided into smaller groups.

Sprains or strains, nail punctures, stepping on nails, falls from ladders, etc., crushed fingers, etc., crushed fingers between barrels, falling on stairway, falling objects, objects in the eye, burns, rollers and hooks falling, knife cuts (both right hand and left hand cuts), hand tools, slivers and splinters, slipping and falling, machinery accidents, acid or chemical burns, electrical burns, machine belt and pulley, elevator accidents, striking against objects, struck by objects, scalds, knife cuts by other than injured party, hand truck accidents, hook punctures, kick or bite by animal, handling material, not reported or lack of information and fighting.

We find that our knife cuts are responsible for 12½ per cent of the total number of accidents in our plant. In making that statement to you I am including all right and left hand cuts and all other knife cuts.

We find, too, that the number of accidents we are having is not decreasing to any extent. The severity of the accidents is being reduced, and I think that holds true largely as a record all over the country. We are reducing the severity if not the number of accidents.

I want to say that in my opinion the man who is doing safety work must get on the job and make a study of conditions as they exist. I heard many things in some of the meetings about holding the foreman responsible. He is the key man but at the same time the powers of the foreman are limited. There are certain things, very decidedly, that the foreman cannot do, and we should not pass the buck to him and then say that he is a bad conductor of the work. There should be a cooperative condition between the foreman and his men.

ORGANIZATION

The next point I want to bring out is the matter of organization. In our plant at all the principal branches we have a representation form of everything between the company and the employees. Each plant in the entire organization is a member of the fire and accident prevention committee, and they make periodical visits and have meetings, and the findings are discussed before the entire body in their monthly meeting. They make two trips through the entire plant each month. One is an educational trip and the other is an accident prevention trip, but, as we all know, these really cover both at the same time. In addition to that there is a watch service, and the one thing that the watchman looks for is fire and accident conditions, and he reports those immediately. In all of our plants we have a fire department.

As I see it, the major portion of the accidents happening are due to either ignorance or carelessness, and if that is true, it becomes more a matter of education. Education must be carried out through the organization, spending all your time figuring out some new way of guarding

against it. Our machinery is well guarded, however, and we think we have an easier job from that standpoint, but we have a lot more hard work to do from an educational standpoint.

It seems to me that in the matter of accident prevention there is not enough attention paid to hazards due to bad ventilation. Take for instance in the stocking vats. The atmosphere is cool and the steam from the meat goes to the ceiling and about the time the worker gets ready to make a cut it drips down on the back of his neck.

Then there is the matter of light. Lighting is responsible for a great deal more accidents than has been given recognition. We all have lights, and we keep on putting in more lights, but they are not the right kind. Are we careful in placing a machine so the light will not strike the operator in the eye? In one state, I think it is Massachusetts, they have a state law regulating the lighting, and under that law the regulating force is under the state police. I think it is highly important that we pay more attention to lights in our plants.

There are lots of things that can be done along that line. For instance, I find lots of places in our own industry where a whole large room is lighted by just one switch. It seems to me they would put in just one light, or two or three or four or whatever is required with a control of one single phase. Quite naturally you say something to a fellow about turning on light. He puts on one light and it remains after he goes out and closes the door. I think we should pay a lot of attention to the matter of placing our lights and seeing that proper lighting is in, and that switches are readily approachable as you are coming into a room or leaving it. Putting in a light is one thing and controlling it is another thing.

MEDICAL CARE

Now to minimize injuries the first thing is proper treatment of all injured at work, and following up those on their return to work. I hear complaints about workmen not going to the doctors after they are injured, but I am wondering if some of that is not the result of the attitude of the physician. In the days before compensation when the doctors were not there, or were not very attentive, and the days of hurried butchery were in vogue, the men did not take the pains to see the doctor. I think then we should exercise more care in selecting our physicians today and, in addition to investigating his particular skill, we should look into his general attitude toward the men. When one of our men injures himself in some way and goes to the doctor he looks for sympathy, and if the doctor says, "Oh, that is nothing," it discourages the men. Do our doctors all show that little sympathy? I say that when we make a selection of a doctor that besides looking into his skill we ought to find something about his personality and his effect on the men.

Another important part of the safety game as I see it is the matter of watching the health of the employees. While, of course, a large number of accidents are due to carelessness and ignorance, I think some might be traced to the physical condition of the employee. We should put forth every possible effort to get the employees to take care

of their bodies. If a man does not know how to eat and take the proper care of his body the injury he sustains is greater. That is a condition which cannot be handled alone by the physician, but it is a mighty important part of accident prevention. There is an astonishing lack of care in the upkeep of the human body and I think that is largely the cause of a great number of accidents.

DISCUSSION

Mr. Schwarze: The question primarily is this: shall we forget safety for production from the foreman's viewpoint? The phase that I want to place before you is this: who shall take the blame, the foreman or the employer? Take it in this instance, where the foreman has brought to him a new man, a man thoroughly instructed as to the nature of the work, hazards, and the task revealed to him, and he is fully aware of all the conditions, but he does what the new man always does—he gets careless and forgets himself.

Mr. Drummond: I think absolutely that there should not be an invisible authority insofar as any one individual is concerned. That cannot be a foreman's job alone or the superintendent's job alone, but every man in your organization right from the front gate up to the president of the company. The great trouble as I said is not to throw authority upon any one man. If the foreman is going to be responsible and try to take care of the whole policy then it is unnecessary to have a safety control.

Mr. Schwarze: The fact is that if you raw materials are not in accordance to specifications Mr. Foreman knows where to place the responsibility; if the machinery fails the responsibility goes to some one else. He has John or Bill or somebody held responsible, but when it comes to the human element in the plant there is a vast variance of foci.

Mr. Drummond: If you have a man that you have instructed how to do that thing and have instructed him properly to do that I think it is a matter that you discipline that man for. But when he has a large number of employees in the department and the work is varied, the employment manager tells the man to go to work by saying, "Jack, there is a truck. Get busy!" In that case I would think absolutely that the fellow did not do what he should have done because the foreman did not properly instruct him in the first place. I think he ought to have given that fellow some real instructions, but we all slip at times. If the foreman will take time and explain to that fellow not only what to do but what will happen, then I do not think you are going to have a repeat of that offense.

Mr. J. I. Fisher (Rochester Railway and Light Co., Rochester, N.Y.): We have in our organization an association of foremen. They meet twice a month and I used to talk to them about accidents in their departments, and about eight months ago in one meeting one of the foremen made a motion that they appoint an accident investigating committee composed of foremen only, to make an investigation and report on their findings as to whether the foreman was to be held for the blame or the workmen or

the machinery. If the foreman is to blame for an accident he is taken to task before the committee. If it is the material he is handling or a machine guard comes off, that is taken up and the foreman immediately goes into his department and tries to remedy those defects.

SLIPPING AND FALLING HAZARDS IN PACKING PLANTS

W. F. MCCLELLAN, SAFETY SUPERVISOR, ARMOUR AND COMPANY, CHICAGO, ILL.

In packing plants, there are many things which can cause employees to slip and fall with resulting injury, but perhaps one of the outstanding causes is wet and slippery floors.

Though, of course, we have janitors whose duty it is to keep floors in the safest and cleanest possible condition, there are many occasions where, for one reason or another, an employee slips and is sometimes injured.

It will be my purpose in this talk to put before you, in some detail, illustrations of the accidents which we have experienced as the result of slipping and falling, and what we do in our plant to prevent as many such accidents as we possibly can.

We realize, of course, that it is human nature to be careless; that employees will, as a rule, go about their work without thinking of their own safety. Accidents due to slipping on wet floors occur unexpectedly; that is, the worker slips before he realizes it and, therefore, has no time in which to prevent his falling. Prevention of such accidents is a matter of keeping the floorings and stairways as dry as possible, so as to ward off the likelihood of slipping.

Formerly, in our meat-trimming departments, pieces of fat, and other greasy substances sometimes reached the floor, causing it to become extremely slippery. However, our killing and trimming floors are now equipped with baffle boxes which prevent such fat from reaching the floors, thus safeguarding the employees. The small platforms on which workers stand are covered with sawdust.

Another item that is often overlooked is uneven floors. Floors should be as even and level as possible, allowing for drainage. We have eliminated many accidents by putting more grit or small crushed stone in our asphalt floors when mixing the material and have replaced many of our brick floors with this material.

As a preventive against slippery floors, applying to all sections of the plant where water or other slippery elements are to be taken into consideration, at the end of each working day, our clean-up squads wash them thoroughly with hot water, leaving them in a clean and dry condition for the following day's work.

Wooden skewers, used in fastening cuts of meat together, sometimes reach the floor through carelessness on the part of employees. Being small and round like a lead-pencil, they are dangerous to step upon, and in many cases cause wrenched shoulders, strained spines, injured hips,

arms and legs. We constantly warn the employees to keep these skewers in their proper places, away from the floor where they and their fellow workers are required to walk in discharging their duties.

HOW SLIPPERY FLOORS CAUSE FALLS

Accidents of these various kinds, however, are not always due to the condition of the floor. For instance, one of our women employees recently slipped and fell upon a perfectly dry, clean floor in one of the dressing rooms. Investigation showed that her heels were badly worn down and that this had caused the fall. This sort of slipping, then, is traceable to carelessness, for run-down heels are dangerous and might cause the most sure-footed person to slip, even on a clean floor.

In our gut string factory, we have experienced several cases where workmen, wearing rubber boots, slip upon a piece of gut. The floors were at first smooth in surface in this factory; later we used C. P. muriatic acid and mopped the floors, washing them off afterward with water to prevent the acid from eating too far into the flooring. This left the gut string factory floor roughened, and has been so effective that we have had no accidents there since.

Oil on the floor around machinery in the power house is a cause of much slipping, and the only remedy is to keep such oil wiped up as much as possible, caution employees to take care in walking in such places, and provide pans or receptacles to hold oil cans and oily waste.

In our plant, our employees have access to peddlers' carts, where they purchase bananas. Passing on through the plant, they drop the peelings, sometimes in places where other employees slip upon them and fall. As a remedy for this, they are constantly requested to throw such peels into the refuse cans which are located all through the plant in convenient places.

Slippery floors make it difficult for workmen to move truck loads of produce from one room or floor to another. Many of these floors or runways are on an incline. If that incline is slippery, there is great danger of falling. Trucks should be pulled and not pushed, for in pulling them there is much less strain upon the worker. Several cases have come to our notice where men were so strained in pushing trucks that they developed hernias. In other instances, workmen have slipped against their trucks, and have fallen face-down against either a sharp corner of the truck or against some nearby obstacle.

In regard to stairways as a source of slipping; we have equipped all of our stairs (where there is any likelihood of water or other moisture coming into contact with them) with anti-slip treads. These prevent many accidents due to slipping on stairs and in addition to this, we watch for nails and other protruding objects which might catch the feet of employees using the stairways; we also take pains to see that the steps are kept free of anything which might cause employees to miss their step and fall. Realizing that dark stairways are a menace to safety and often cause serious falls, we have seen to it that all are properly lighted so as to indicate plainly the location of the steps.

Accidents on stairways are not always due to the condition of the steps, however. We experienced one case where a woman employee wearing high French heels, lost one heel with the result that she tripped and fell to the foot of the steps, injuring herself more or less seriously. The remedy for casualties of this sort is, of course, the proper sort of working shoes, with extra care to see that the heels are not allowed to run over.

PROPER USE OF SCAFFOLDS

On wet stairways in cellars, we use a heavy sanded burlap. Stairways that are not provided with safety threads should never be allowed to let the nosing of the step wear down as this will cause a person to slip and fall very quickly.

In working upon scaffolding to install pipe-lines, etc., our workmen sometimes meet with accidents. In hurriedly building a scaffold in order to handle a rush repair job, they sometimes fail to securely anchor down all boards; this, needless to say, is dangerous practice and one or two falls have been caused by treading on a loose board. Also, in regard to scaffolds, they should be properly placed so as to be securely stationed upon the floor or other base, so that there is no danger of the entire structure collapsing during the repair work. In some instances, men use horses with a plank bridged between, and fail to properly place the ends of the plank, causing them to lose their footing and fall. Also, care should be taken to build a railing along scaffolds with toe board so that workmen may take hold when moving from one place to another, or for use in case they should slip.

The plank used for platform on a horse scaffold should conform to the same specifications as for other scaffolds. Good practice is to use planks 2x12 inches and 16 ft. long. The horses should be placed close enough together to prevent springing of the plank. If any horse is not the correct height to support the plank without springing, a board the right thickness should be nailed to the top to bring it to proper level. Under no circumstances should brick and small blocks be placed under the legs of a horse to secure the proper level.

Next to scaffolds as a source of injury come ladders. The base of the ladder, if placed upon a cement floor, is apt to slide out, causing the ladder to tumble down. This is remedied through using rubber cushions on the bottom of the ladder, or by placing a long plank on the floor and putting the base of the ladder against that plank which, being of sufficient length, grips the floor over a considerable distance and provides enough traction to hold the ladder up securely.

The rungs of the ladders should be inspected as closely as possible to detect, beforehand, any weakness which will cause them to break when the weight of the workmen is placed upon them. Ladders built in a hurry by workmen engaged on a rush repair job, are sometimes unsafe for use, the rungs being insecurely fastened to the upright. Workmen should be cautioned not to be too hasty in preparing for any work

in which they depend upon ladders, scaffolds, etc. Step-ladders are often used: these should not be braced with rope or wire, but should be rigged with securely fastened metal braces, so that there is no danger of collapse.

ELIMINATION OF ICE DOCK DANGER

We have had our trouble with ice dock hazards but believe we have solved the difficulty by the use of chains stretched between the posts which prevents any one from falling off the docks, at the same time giving plenty of room for the ice chute underneath.

Another dangerous practice around loading docks is for men to drive nails in the platform to hold the plate in the doorway of cars while loading. You will agree that this is dangerous as the men do not pull the nails out when through. To get around this, we have changed our docks somewhat which allows the plate to lay level with the car doorway and platform does not need any nails to keep it in place. This style of platform has eliminated a good many accidents and we intend to build all platforms or loading docks along similar lines in the future.

Another feature is the iron plates used in car doorways. These do not get buckled or bent out of shape when they lay level as they do when on an incline with the result that they can be stood up against the wall out of the way when not in use.

In closing, I would like to say a few words on "good housekeeping," which has to do with falls as much as any other item in the packing industry. In every plant the men, hand trucks, wagons, follow certain paths or aisles. These should be kept clear at all times of any obstruction and well lighted, and especially if material is piled along aisles or paths care should be taken to pile it in an orderly fashion so as to prevent same from tipping or sliding down due to vibration when passing. At the close of the day's work, care should be exercised in seeing that no trucks or other obstructions are left in aisles that may cause watchmen or night crew falls in the dark.

DISCUSSION

Mr. Cromwell: I think we had three slipping accidents last year and one was in the finishing department where we have a dry floor except near the sponging tables where the trucks sometimes drip. In that case the man injured his kneecap.

In the scrub house we have wooden floors and they are wet about 98 per cent of the time. We tried concrete flooring but the men did not seem to like it, and I do not believe there will be any more concrete floors put in. In some places we have taken up the concrete floor or put a wooden floor on top of it. It seems that the wooden floor is the only one we can clean and keep from spotting. We tried steel floors in some places but you have worse slipping there than anywhere else, and I do not see how we can ask the men to work on such a floor. I think wood is about the only thing we can get and have any kind of success with at all.

Mr. Hudson (Canada): I find it very difficult to keep the floor clean in the press room on account of the grease. Then there is another difficulty that I have run across lately and that is tacking nails left on the floor and carried sometimes on the stairs. I have no report of any accidents in the plant but I find myself occasionally stepping on these nails on the stairs. It seems to be a difficult thing to get over these things and be on the safe side.

Mr. Cromwell: I might say that frequent washing with steam and water mixed will tend to draw the grain of the boards up and leave a rather rough surface. We find that helps out a lot.

Chairman Eaton: I wish to advise that Mr. Eldredge, chief, fire prevention department, Endicott-Johnson Company was unable to get here and sent his paper by another member of the firm and that member lost the paper, so that we have to turn this paper into a general round table discussion.

ROUND TABLE DISCUSSION

Mr. Schwarze: In the hide house we had a hazard that is more or less general in the tanning industry, and that is the exposure to anthrax germs. Recently we had a case outside of the tannery, and the man finally died from the anthrax infection. The newspapers covered the case in this way: the man was a shoemaker and the health authorities considered his exposure too great. The authorities asked for a ruling on the case and I went to see the man's stock of leather and shoes and that did not look quite right to me and I took the matter up with the health authorities and found that the anthrax germ was carried through the entire tanning process, that through the entire finishing stage it was possible for the anthrax germ to exist in any finished leather. That was quite new to our production staff in general. It had been thought after all these chemicals had been applied the leather was deprived of the anthrax germ. We carried that further and finally agreed with the health department, and our prevention of those diseases has been to apply bichlorid of mercury to our soles before entering the hide house. We have had no anthrax infection in our tanneries for five and one-half years, or since we have introduced that disinfectant problem.

A thought strikes me now relative to an inquiry I had from the hide trimming department as to what general process was used in the trimming or what knives or guards were used. I would like to have some discussion on this matter. In the beam house proper our processes are more or less sixty per cent mechanical and our machinery is well guarded.

Reverting back to the matter of maintaining safety to the highest degree I will say that our foremen pledge themselves each week that they will keep all machinery well guarded and in the best condition on every floor, in the tank room and everywhere in his department. Likewise he pledges himself that he has thoroughly instructed each and every man as to their individual tasks and has warned them of the hazards that are hidden and those that are fairly apparent.

Mr. Cromwell: Picking out accidents in the first six months in our plant I found there were 16 injuries to the head, 24 to the body, 19 to the arm, 25 to the leg and 64 to the hands. When I say hands I mean both hands including cuts to the fingers, splinter under the nails, etc. There were 20 foot injuries, and only one acid burn. I think that is very good for the amount of acid that is used. There was only one nail injury reported and only one lime burn, and in this instance the man got over his boot in the lime and did not take them off and the consequence was that his foot was badly chafed. We had about 10 steampipe burns. We are getting away from them as a general rule and those 10 came from the sponging table. We had 14 infections, and these came from not taking proper care of the wounds.

The method I am using at the present time is a sort of bonus. I offer a prize to the one who reduces his accidents to the lowest level at the end of the year. I think that is going to turn out very well.

Chairman Eaton: The question that Mr. Schwarze brought up a while ago about the anthrax germs going through the whole tanning process brings up something that might be worked out at our next meeting. Some sort of paper might be worked out along the line of whether our tanneries are putting out some leathers that are detrimental to the health of the public, or whether there is anything left in the leather after it leaves the tannery that would cause that leather to be detrimental to the public health.

ADJOURNMENT.

Paper and Pulp Section

October 2, 1923

ADAM WILKINSON, Chairman

American Writing Paper Company, Holyoke, Mass.

GEORGE PHILLIPS, Vice-Chairman

Champion Fibre Company, Canton, N. C.

WILLIAM F. DEWEY, Secretary

B. D. Rising Paper Company, Housatonic, Mass.

MR. JOHN F. SANDEL: Your Chairman is unavoidably delayed for very good reasons. I would advise that you select a temporary chairman until Mr. Phillips, vice-chairman, comes to the meeting.

(Mr. W. A. Gleason of the Hammermill Paper Co. was elected temporary Chairman and assumed the Chair.)

The officers of the section had no reports to give.

Chairman Gleason: I will appoint Mr. Altman, Mr. Costigane and Mr. Hoyman on the nominating committee. This committee will meet some time during this session and report their nominations for officers for next year.

THE VALUE OF PHYSICAL EXAMINATIONS IN PULP AND PAPER MILLS

**SETH L. BUSH, MANAGER OF RESEARCH, CROCKER-McELWAIN COMPANY
AND CHEMICAL PAPER MFG. COMPANY, HOLYOKE, MASS.**

I am not a M. D. Lacking the training of a physician, I am therefore unable to handle my subject from the technical viewpoint of the medical man. My interest in physical examinations comes because, as an industrial relation man, I am convinced that health is an important factor in determining the peace and progress of any industrial group.

Physical examinations in our plants are but a small part of our industrial relations, and our success with them has been influenced largely by the effect of the general program. Because of this, it may be well to sketch briefly the basis of pleasant contact and relationship which had already been established before we considered the question of examinations.

About a year before, we adopted a neutral territory individual agreement, which every employee is obliged to sign, and which places upon him the responsibility of conducting himself with reason while employed and of quitting clean when he goes. This agreement has apparently eliminated from our plants all questions of factional difference, whether they be of union, color, race or creed.

The service differential which we pay in increasing amounts during the first four years of employment, and our guarantee of full time employment after five years, have been attractive.

A very pleasant but informal contact has been established through workmen's committees for discussion of any and all questions of mutual interest.

All this has undoubtedly assisted us in obtaining and keeping the right kind of employees, and has overcome the natural disinclination of applicants to undergo a physical examination. The fear of some of our friends that we would be handicapped by a limited number of applications on account of such an employment requirement has not been realized.

I must confess that the first serious thought given to this question of compulsory physical examination of applicants for employment in our plants, was prompted by a selfish motive—that of dollars and cents.

We had at one plant an employee with strong indications of tubercular infection, who became the victim of a peculiar strain, which he claimed to be the result of an accident in the mill. This case dragged along for many months and before it was finally closed, we were certain that we were being thoroughly imposed upon, and that the employee in question was in no worse a condition than when he came into our employ.

About the same time we were in trouble at the other plant, with an employee who claimed he had suffered a bump on the knee, and although it developed shortly after that most of the trouble with this man came from a serious disease, which he must have contracted some time before he entered our employ, still it was with the greatest difficulty that we finally closed the case, even after it had been fairly demonstrated that the employee was a malinger.

Then we had one or two suspicious hernia cases which gave us some concern.

PHYSICAL EXAMINATIONS DECIDED UPON

Altogether the situation seemed so grave that we talked the matter over frankly with our workmen's committee, and together decided that physical examination of applicants would be mutually advantageous to employees and management. We concluded that such examinations would protect employees from new comers who might become a health hazard to them and an accident compensation burden to the company.

The more we discussed the matter, the more we felt certain that there would also be a distinct advantage to many of the applicants themselves, through their becoming acquainted with their own physical condition.

Applicants are examined by our part-time plant physician, who calls for about an hour at the plant each day.

The examination covers the following points:

Sex, color, whether married or single, age, weight, height, eyes, ears, nose, throat, teeth, gums, temperature and pulse, arteries, blood pressure, heart, lungs, abdomen, extremities, reflexes, urinalysis and G. U.

Up to July 1, 1923, a total of 547 applicants were examined, with corrective treatments prescribed in 154 cases.

RESULTS OF EXAMINATIONS

It is interesting to note that 55 hernia cases were discovered; 36 being first degree, 7 second degree, and 12 third degree. In all cases of hernia the applicant has been advised as to having an operation or procuring a properly adjusted truss. If the cases are at all advanced the employee is not allowed to work until he has procured some corrective treatment.

Thirty-two applicants were found to have venereal disease and all such cases were immediately turned over to the local public clinic.

Thirteen cases of suspicious tuberculosis were discovered and all such cases have been closely followed up, with the temperature taken each afternoon and the best possible advice given for control of the trouble.

All cases where a urinalysis has shown the presence of albumen or sugar, have been closely followed up. Among these cases were 29 pronounced diabetics.

Through examination of the ears, 27 cases of impacted wax were found, some of them quite interesting. One applicant had been almost deaf for twelve years, but after the removal of the wax, could hear perfectly.

Cases of defective eyes were followed up to arrange for corrective treatments.

In the nose examinations a large percentage of deviated septums and enlarged turbinates have been advised to see a specialist.

All those with defective tonsils are advised as to the danger of heart infection, rheumatism, etc.

We do not employ a plant dentist but in the examination of the teeth a large field for preventive work has been shown. Much Riggs disease has been found, turned over to the family dentist and followed up.

Wherever a high rate in blood pressure has been noted the applicant is advised as to treatment, and the case is reported to the family physician.

Many interesting cases have been found but it is only such cases as refuse to have proper treatment that are definitely turned down.

One man refused to get a truss for a second degree hernia and was consequently not allowed to go to work.

One potential apoplectic was advised as to his condition, and was persuaded to look elsewhere for easy work.

Many times it has been fairly demonstrated that the healthiest looking individuals may have serious complications.

One case of a perfectly normal appearing man of good weight and stature was discovered to be such a serious diabetic that after a conference with his family physician, he was advised to take much lighter work than he had been in the habit of doing.

A very recent case was that of a well appearing young man, above the average in intelligence, who was welcomed with open arms by the employment office and by the foreman who had a vacancy, only to discover through the physical examination, that he had a serious spinal curvature, strong indications of tubercular trouble, a tendency toward diabetes, and had undergone a serious operation, which together with the other indications absolutely unfitted him for anything like the work he was contemplating.

"Our experience has demonstrated that successful conduct of physical examinations does not mean the exclusion of a large number of unfit applicants. It is rather a selective process whereby the applicants are placed on the work best fitted to their physical capabilities and limitations. The fact of the case is that we have refused employment to only two of the 547 examined—one, a case of advanced diabetes, the other, a potential apoplectic, who has since died. In both cases, we apparently satisfied the rejected applicants that it would be unwise for them to accept the work they desired on account of the direct hazard to themselves."

This brief recital of the results of our examinations will serve, I am sure, to demonstrate fully that the physical examination is of very definite value to the applicant himself. We have satisfied ourselves that there is a large enough percentage of serious accident and health risks among applicants to make the examination very much worth while, from the viewpoint of the Company.

DISCUSSION

Mr. F. H. Rosebush, (Nekoosa-Edwards Paper Co., Port Edwards, Wis.): In connection with these physical examinations I would like to ask if they had all their former employees take the examination, and if they met with any antagonism?

Mr. Bush: We did not, Mr. Rosebush. All our employees who were with us at the time did not take the examination. We felt that they had been employed without that restriction and we felt we should not insist on it with them.

We are working on group insurance now. We have been working it out for three years. We have not felt that what we have considered in this line satisfied us. We are talking it over in the workmen's meetings and bringing in a representative of one of the insurance companies and talking over every point, cost as well as coverage; and we expect to have that in force within the next few months on somewhat different lines than we have seen before; and when we get that in shape we hope to make it possible for all employees in the plant to have a physical examination once a year regularly. It is our idea to make that a compulsory examination, but it is also our idea to make it very plain to all the employees that when they pay their share towards the group insurance cost, they are paying the expenses necessary to furnish a physical examination once a year. Then we expect to start some education through the mill, urging them to take the physical examination each year for their own good—not

compelling them to. We rather believe that we can educate them up to the point where they will see its value and most of them will be glad to do it each year; and certainly if they do not do it; they will know they are paying for it and missing something that they should be taking advantage of.

Mr. John W. Shepherd (Eastman Kodak Co., Rochester N. Y.): We have a physical examination once a year, and if at any time the management feels an employee needs it, he gets a slip and has to be examined at any time.

Mr. David S. Miller (York Haven Paper Co., York Haven, Pa.): Just how is a physical examination a benefit to any company who employs 547, when only two are rejected? I did not get the thought. I would like to ask Mr. Bush that question.

Mr. Bush: Well, take the question of hernia, for example. I have forgotten just the figure, but it seems to me there were something like 12 third degree hernias, which, of course, is a very serious stage in a hernia case. Now, all those 12 hernia cases were put to work. Some of them obtained proper devices; others went to the hospital and were operated on before they went to work. There were some of those folks who did not know they had any trouble and they were glad to find out. They went to the hospital and were operated upon before they went to work.

We had been putting those new men who came to us with that handicap to work without caring for them, and some of them were going into the heavy lifting work on our platform and so on, thus creating quite a hazard. That hazard has been eliminated. The men did not lose their jobs. They have gone on and worked just the same.

Now, when a man goes onto the job himself, in better health, or realizes his handicap and watches himself and takes care of himself and keeps himself in better health, it means value to us the same as to him, because we have got to help the men on the job so they will be less of an accident risk.

THE PENSION SYSTEM

Mr. A. P. Costigane (Sec'y and Safety Engineer, Ontario Pulp & Paper Makers Safety Association, Toronto, Ont.): The pension scheme helps bring about an amicable relationship between the company and the employees.

Mr. Bush: We have no pension scheme; in fact, we do not believe in it. Now, our idea on that is merely that if we pay the highest wages that we can see our way clear to pay and get the best employees that we can find, and keep those employees on the job year after year—if they are the right kind of employees—furnish them full-time employment; urge them to save; help them save and buy their homes; if we put them onto an independent basis themselves and teach them that that is the way to get along, and then make it possible for them to have the opportunity to get along, year after year, on the same basis that is possible on a salary right straight through the year, they know, if they are not sick, that they are going to get so much money right straight through the year, every year they are with us; and they can plan their saving and regularly

save and look out for the day when they otherwise might be a subject for a regular pension scheme. We believe they should be independent and work for themselves. That is the idea. Then the individual cases that need attention, we take care of in an individual way and do not turn them down.

Mr. Al. Kroes (Employers Mutual Liability Insurance Co. of Wis.): I would like to know what Mr. Bush's experience has been in the attitude of Christian Science workmen, who refuse treatment.

Mr. Bush: We have not had any experience in that line. We have not found him yet. We have had some of the men who said that they did not believe there was anything the matter with them and it did not make any difference, and so on; but we have got two fine nurses, extremely tactful, and they have got a very delightful way of following up cases that need following up without making themselves obnoxious; so that when a man just does not respond, why they find some way of getting next to him, at home or in some way. I remember one case of an old man who had been with us for a good many years—one of the old school—and by hook or crook he had survived the chance-taking of these many, many years. He had worked in the maintenance department as machinist, machinist foreman and so on. He is an old man. When we first put our clinic into operation and told all our folks who got hurt to go to the clinic, the old man laughed and wouldn't have anything to do with it. One day he got hurt and the foreman told him he had better go to the clinic and have himself taken care of. They had to drag him there by the neck, but he finally submitted to having himself fixed up, and the nurse was nice to him and so on; and it was not very many weeks after that I went there one morning and I found that old fellow sitting down and the nurse spraying his throat. He had a cold or something, and the nurse was helping him get it fixed up. You should lead them and they will come, Christian Science or not.

SAFETY IN THE PAPER INDUSTRY

HUGH P. BAKER, SECRETARY, AMERICAN PAPER AND PULP ASSOCIATION, NEW YORK CITY

The paper industry has been very responsive to the excellent work of the Paper and Pulp Section of the National Safety Council, and is deeply appreciative of the work of this Section. Safety in the paper mills, as you understand it, is not yet sold to all of the pulp and paper mills, and it is not to be expected that the sale will take place until educational work is done that will convince the mills of the desirability and the necessity of guarding efficiently the safety of the workers.

A New York organization recently made a general study of the interest and support given by groups of men and women to various organizations, religious, fraternal and commercial. Assume that we have five hundred pulp and paper mills, how many of these mills will take active interest in the application of safety methods; how many will be only passively interested and how many will oppose any action? The result of investiga-

tion here in New York determined that, generally speaking, one third of any group of men or women making up an organization will be active in the work of the organization. The second third will be active if they are crowded by the first third. The last third are members of the organization for reasons often not connected with the purposes of the organization, or because they are afraid to stay out of the organization. This last third will be resistant to the aggressive work of the organization and, in a way, will always have to be carried, more or less, in any forward movement. It would be interesting to see how this "rule of proportional support" applies in the acceptance of safety practices in the pulp and paper mills.

Any trade association of value to an industry is concerned constantly with the protection, promotion and perpetuation of that industry. In serving an industry along these lines of promotion and perpetuation particularly, an association must work always along these lines of promotion and perpetuation particularly, an association must always work with certain factors of assured safety, such as safety in supply of raw materials, safety in the assurance of a market and assurance of an adequate supply of the right kind of labor.

SAFETY OF LIFE AND LIMB VITAL IN INDUSTRY

This section is concerned in all of its activities with promotion of methods which will assure safety of life and limb in the mills. The trade journals which are serving the industry so well repeatedly print articles by men who understand the application of safety methods in the mills; these articles illustrate devices which will assure safety to employees. It would be quite out of place for me, as a forester, to attempt to discuss the details of safety appliances and methods with which you have great familiarity.

The National Safety Council, through very effective educational efforts which have been projected through all the Sections, has now come to be recognized as the great advocate of safety, not only in the industries but in the daily life of the people. One has but to go through the General Program of this meeting to appreciate the wide ramifications of the Council's work. It is very largely educational, though the results now being obtained as a result of education are being felt in all the industries and are benefitting employer and employee alike.

There must be aggressive educational effort made in assuring safety to the industries, not only in the way of life and limb of the employee, but in the matter of raw materials, assured market, and a constant supply of labor of the right kind. The fundamental safety which every industry is seeking in the way of being able to so operate that there may come reasonable profit from funds invested and from service given, might well include another feature which is a factor difficult to measure and difficult to inject into the relations of men. This is the securing of harmonious relations between employer and employee, aggressive cooperation between the great industries of the country with their many

common interests, and satisfactory and successful cooperation between the industries and the various phases of government with which they come into contact,—municipal, state and federal.

ASSURED RAW MATERIAL SUPPLY FUNDAMENTAL IN SAFETY

No industry has been developed in this country, with all that that means in the way of business initiative, capital and market, without there first being an assured supply of reasonably cheap raw material. However, this country has been so tremendously blessed with natural resources from which it secures raw materials for its industries that, in some cases, great industries have been developed without reasonable thought as to the availability and permanency of raw materials.

The paper industry is a good example of a great industry for which there has been such easily available raw materials that there has been little thought for future permanent supply of raw materials. The forests from which pulpwood comes have seemed so inexhaustible, and pulp mills have had so little difficulty in getting the wood desired, that many mills have been developed as converting mills upon the assumption that there would always be an assured supply of necessary pulp. Other industries have been built up with the same indifference as to the essential raw material upon which the future of the industry rests.

For much too long a time the converting paper mill, not owning forest and not producing pulp, has gone on with investment in the mill and with development of market, feeling that somehow or another pulp reasonable enough in cost to warrant development would always be available. There has been too little consideration of the fact that our forests are being cut four times as fast as they are growing, and that we are rapidly nearing the end of the virgin supply.

The difficulties which the paper industry faced during the War in securing necessary pulpwood, in many cases gave the converting mills their first thought that interest must be taken in the forest and in the practice of forestry. The recent action of the Canadian Parliament, in passing an Act which empowers the Canadian Government to place an embargo upon all wood from Canadian lands, comes as a very strong second reminder that the paper industry is an industry, founded on the wood pile. If the wood pile cannot be constantly restocked, and that at a reasonable cost, the very permanency of the paper industry is threatened.

Can any one of you think of an American industry that does not draw for its products upon some one of our national resources? We are at the end of free land for the settlers in the west. We are appreciating our limitations as to future supply of oil and are reaching beyond our boundaries for supplies that will take care of us in the future. We are going farther afield and deeper for minerals. All of this is developing gradually the consciousness on the part of the people, that as a nation we must practice conservation, and, if we are to continue with our industries, we must not only practice conservation but must increase the supply of raw materials upon which we are dependent. Can there be any question that assured supply of raw materials is a fundamental element in safety?

SATISFACTORY MARKET A FACTOR IN THE SAFETY OF AN INDUSTRY

Why be concerned with a supply of raw materials, with available and satisfactory labor, and why concern ourselves with the safety of the laboring man, if the industry which we serve cannot be assured of a reasonably good market for its products?

The desire for greater production and more business has, in many cases, brought about over-capacity; and to take care of this over-capacity we have sought new uses for our products, or we have concerned ourselves with the development of foreign markets. We are forbidden by law to restrict production or to divide territories in which we market our goods, and any reference in a group of manufacturers to the question of price is "the worst of offences." It seems very reasonable to assume that with increasing competition for the markets of the world, the time will come when anti-trust legislation must be changed so that the public good will be considered and certain mutual agreements will be allowed as to restrictions of production, division of territories, etc.

The industry which it is my good fortune to serve has seemed very loath to consider any aggressive or united action in promoting foreign markets for paper, yet there appears to be a decided tendency toward over-capacity in many different branches of the industry. The result of this must be an ever keener fight, with the survival of the fittest; meaning, of course, discouragement and loss to those who go down in the struggle. The paper industry could well afford to spend considerable sums of money in the next few years in developing foreign markets.

We are so blessed with natural resources, particularly with the resources upon which the paper industry calls, that even with higher labor costs it is difficult to understand why the great South American market, for instance, should be turned over without a struggle to Canadian and European paper manufacturers. All concerned in any way with making this fundamental industry of ours permanent in the country must consider this question of a satisfactory market as a fundamental factor of safety.

SUPPLY OF THE RIGHT KIND OF LABOR SAFETY FACTOR

Of the elements making up an industry, that of a satisfactory supply of labor is the one to which the average manufacturer gives the greatest thought over a given period of years. As in the case of raw materials, labor has been abundant and of fairly satisfactory character in the past in this country.

For years we have been able to attract from European countries people similar to the original stock in this country and people easily absorbed into our industries. With the slowing down of immigration from the northern countries of Europe, and the great need of common labor, there has come into this country in the last twenty years many thousands of men and women from the eastern and the southern countries of Europe. These people, of a different blood, and brought up under

different cultural conditions, have been much more difficult of amalgamation than the peoples from central and northeastern Europe. A certain slow amalgamation of these peoples is taking place, but there is greater need for educational activity with them. This educational need means that there is opportunity for the industries of the country to unite in efforts to make these peoples of southern European blood fit more satisfactorily into our industries.

In many cases pulp and paper mills are located in isolated sections, and have been developed with labor from the local population. Gradually, however, as other industries have developed about the mills and as the Southern Europeans have crowded into almost every section of the country, our people are faced with the problem of dealing with two radically different groups. It is far from safe to consider the future of the pulp and paper industry without considering the necessity of using the eastern and southern European, either in groups or in mixture with the older and native labor.

One of the difficult problems which has arisen in using labor from eastern and southern Europe has been the apparent readiness of these groups to be led by agitators who are often unprincipled or who have radical leanings and connections. As a matter of safety, the industries could well consider seriously this question of just how labor is organized and led. In numerous cases, where radical leaders have been forced out, the problem of satisfactory contact with labor has been a very different question from what it was with the radical leader in control.

Labor is very much in the saddle in some of the foreign countries, and it behooves the industries of this country to study the results of labor's influence in politics in foreign countries that our own industries may at least be prepared for even more difficult relations with labor than now exist.

After all, labor is a vital element in all of our industrial activities. Antagonisms must be broken down and efforts must be made to bring about harmonious relations. The human factor can never be handled, or its problems solved, in the way in which we solve problems of raw materials. Unfortunately there are still individual plants in various industries where labor is considered and handled as it was under the very different conditions existing in the Seventies and Eighties in this country and abroad. Education and understanding is doubtless the solution of the problem of the relationship between the employer and the employee, as it must be the solution of the problem of raw material and of market.

HARMONIOUS RELATIONS NECESSARY TO COMPLETE SAFETY

The necessity for harmonious relations, as between employer and employee, has been pointed out in the discussion of labor as a factor of safety. Harmonious relations have been achieved and can be achieved, and, in the long run, will be fundamental to success in industry.

In every industry there are essential groups which have often unfortunately been antagonistic groups. In the paper industry we have one sector of the cycle of activity occupied by the producer of pulp, another by the paper manufacturer, a third by the merchant and a fourth by the ultimate consumer. Too often in the past the paper manufacturer has focussed his entire attention upon production, failing to appreciate the necessity for harmonious cooperation with the other elements of the circle and, as a result, has often been forced to dispose of his product at much too small a profit. There are still too many manufacturers who consider that the manufacturer and the merchant are in direct conflict with each other; again, there are many manufacturers who feel that the operator who produced wood and pulp is in another sphere, and not necessarily vital to his welfare, providing he can secure the pulp at a figure that will let him make a profit on his paper.

The difficult economic conditions ahead, facing as we appear to be a period of declining prices, and with a promise of tremendous competition from a rejuvenated Europe, makes it very essential, if not a necessity, that the various sectors of the circle of the paper industry should come to feel that they are a part of one big industry, and not separated and antagonistic parts. It has seemed difficult for the various elements in the paper industry to appreciate that when the paper manufacturer is having poor business, business is poor for the manufacturer of pulp, the manufacturer of machinery and supplies and the merchant. There are common problems and common interests that, in the days ahead, must draw all of the groups together to work as a completed circle and to the benefit of all.

For too long a time there has been indifference, and often antagonism, between the great industries of the country. Industry has much to learn in the way of organization from labor and agriculture. Not that industry should be organized as labor and agriculture are organized today! Only as the business of the country comes together effectively to insure the protection and perpetuation of natural resources to meet the onslaught of those who would increase government regulation and control and to meet competition in foreign markets, will there come results necessary for the successful carrying on of business and industry.

Time and again in the past few years there have been almost tragic examples of industries, and of individuals within industries, waiting until they were on the defensive or until they were under attack by the Government, before they were brought to an appreciation of the necessity for the interest and support of the public for their industries or before they were ready to meet investigation and attack to which all industry seems susceptible. Organized effort on the part of the industry will go far toward preventing injurious and confiscatory legislation, and very far toward winning the support of the public in solving of problems confronting industry.

The public which, after all, controls the country through voting power is reading and thinking as never before, and exercising greater independence as citizens and as voters. As a rule, and in the long run, the American

people are fairminded. If industry will take its problems to the public in a frank, sensible way, through organized education and publicity, a long step will be taken toward preventing radical and destructive legislation.

It has been expensive for some industries to take the attitude in the past that it's none of the public's business as to how the industries are operated. In many cases this attitude has been continued until dangerous legislation is introduced and then there is a rush to the state capitals or Washington, with the expenditure of large sums, to prevent such legislation. Aggressive cooperation must be practiced by the industries to keep pace with the same sort of aggressive cooperation on the part of the labor interests of the country and the agricultural interests. We must not have industrial blocs or unions, but for safety's sake we should have a common-sense working together of all of the great industries for the solution of common problems.

DISCUSSION

Chairman Gleason: This is rather a new phase of the subject. Dr. Baker's thought, in bringing that out, is that if we are to preserve the permanency of the paper industry we must secure the cooperation of all the mills, not only as regards raw materials, which are necessary; but also in connection with the labor problem, the labor supply and the sale of our products. This thought might be borne in mind by all as we return to our plants.

Dr. Baker also brings out the thought that in the past our industry has been slow to take action on our raw material, and then at the last moment we rush to the Legislature trying to prevent the passage of certain laws affecting it.

We have attempted here in this section the working out of a safety Code for the paper and pulp mills. Mr. Altman, the Chairman of that Committee, is here today, and I am going to ask if he will take charge of that part of the program.

DISCUSSION OF CODE

Mr. R. M. Altman (Marathon Paper Mills Co., Rothschild, Wis.): For the benefit of the uninitiated, let me explain that about three or four years ago the National Safety Council took the sponsorship of a number of safety codes, among which the Pulp and Paper Section was one. The beginning of the work took place, as I said, about three or four years ago. Then during the depression we had to stop working on it for a while, and last year we came back; and finally we have come to the point where we believe we are on the last lap. We have done everything possible to get this work to the various mills, not only in the United States, but Canada, and have their criticisms—both constructive and destructive—and have the code gone over by a committee, so that when a final draft is made it should be something that every one interested in the paper industry has seen.

I believe that each one of you who is a representative of a paper mill has had one of these copies sent to you with the request that you go over

it thoroughly and have your criticisms ready for this open meeting. This is the last opportunity that we will have to have any constructive or destructive criticism on this draft, and we certainly would like to have this thing go out as something which is worth while rather than that these criticisms come in after the draft has gone out. There should not be any reason for anybody saying anything about it later on because everybody has been given an opportunity to do it before the draft was made. We have had a number of letters commenting on it. We have had a number of letters giving us different terms than the ones used; and all these terms may come up in this meeting today and change it.

It has been the custom, in taking up this draft in meetings, to take up the process from the very beginning, the pulp yard, through the sulphite department, etc., to the shipping and finishing; and it seemed that every time that we were near the end of the paper department we made a rather hurried exit. For that reason the latter part of the code did not get the same attention as the first part did; and for that reason I thought that we should start with the paper department today and go back to the unloading of pulp. Are there any suggestions in regard to that proposition?

CODE INCOMPLETE FROM PAPER MILL STANDPOINT

Mr. Bush: Perhaps, because I have not gone through this personally, I should not stand up here and try to offer any suggestions; but I turned the code over to my assistant, who looks out for the actual safety inspection around the plants, and asked him to go over it thoroughly with our manager of maintenance, who has charge of the installing of any safety appliances; and they went over it together, and the comment they made to me, just before I left home, was that while they felt it was very good, they thought it was very incomplete from the paper mill standpoint. The operations, such as we think of them in the paper mill—the writing paper mills in our section—are not anywhere near covered in this code. It looked to us as though it were a code built up from the standpoint of a plant manufacturing pulp primarily and operating a paper mill as a sideline. In Holyoke we are operating paper mills and buying the pulp as our raw material from outside and such items as platers and finishing room operation did not seem to us to be adequately covered in this code, taking all kinds of paper mills throughout the country.

Mr. Altman: I am glad you brought that out. It seems as though those who have been taking an active interest in the getting out of this code are those who are operating sulphite mills; and in connection with the information that we have to have for rag mills, we had to ask the various plants; and if you have ever had a job of this sort you can realize how little information you can get unless you go down and drag it from them. We had to ask them for those points because we are not familiar with the writing paper end of it. We did receive a few suggestions, but they are not enough; and that is the reason

for holding this open meeting today and asking those who are here to give us the information desired, because we do not seem to be able to get it in any other way.

Mr. Bush: I would hate to offer a criticism and then not back it up with any offer of assistance. If we, in our plants, can help you any on that, I would be very glad indeed to have my assistant, who handles those matters in detail, give you some time and attention to help you out; and if you wanted him to, I would be very glad indeed to have him meet with you out of town somewhere and help you out.-

Mr. Altman: Thank you very much. The members of this committee has been a very hard proposition for the entire committee to meet at one time on account of the distance; so we had western meetings and we also had eastern meetings. Mr. Wilkinson is supposed to take care of the meetings down east, and did; what the easterners did was to criticise the points that the western section made, but did not add very much to the writing paper end. That is just the thing this meeting is for, to bring out that kind of information.

The Council has given us just one day for a meeting, but that was with the understanding that if the membership wanted, they could very easily have another session the next day; so after we get into this, if we find it is valuable and worth while, if we want to continue tomorrow morning and finish up the Code, we could easily arrange for another meeting tomorrow.

Mr. John Lundrigan (International Paper Co., New York City.): In making standard codes, or whatever you call them, we have been a little bit puzzled in studying that proposition. I am apologizing for appearing to be in any way critical. We operate in five states, for instance, and in the Dominion of Canada. We have a different regulation regarding elevators, for example, in every one of these jurisdictions.

In studying over this Code, I wrote for copies of those codes mentioned in paragraph 13 of the Paper and Pulp Mill Code. The reason for that is that you find, through the different divisions, that some one of those codes are simply quoted. Well, we did not know whether that particular code would be a question of criticism or whether it would be satisfactory to us as it stood. Now, of course, I do not know what the plans of the committee are for the future disposition of this thing, but I do know this: that from experience—and sometimes a sorrowful one—when an association of this kind makes a suggestion the legislature is very apt to enact it into a law; therefore, you are practically writing the law. What our company intended to do was to make an extensive study of the different divisions that you gentlemen have worked out here, because we feel that the people who are doing that work should be cooperated with and encouraged. We do not want, of course, to unduly extend that period of work; but I do not hardly feel that we would be doing that in holding another session before we conclude this. I would like to have some arrangement whereby we would all agree to work pretty hard for the next year and then try to adopt a code for presentation at the next meeting. I believe that we can keep a lot of people pretty busy on some

of those very important provisions. I had some sessions with some men whom we believed to be splendid authorities, and they disagreed point blank with some of the minor provisions. We also intend to make some suggestions which will be helpful; but I will say very frankly that we cannot do it today or tomorrow. It is a case of continuing this work over a long period of time; and I will take the chance, if it is in order at any time, to make a motion that the activities of this committee be continued, with the idea of making a final report on this Code at the next annual meeting. I do not want to interject that at this time, but I am perfectly willing to take the responsibility for making such a motion.

CODE COMMITTEE IS COMMENDED

Mr. Robert McConnell (Defiance Paper Co.): I am from Niagara Falls. I feel largely the same as the gentleman across the room. I received this paper and went through it briefly, and I had some of the boys around the mill go over it. We manufacture the raw sheet and convert it into wall paper; but I believe this committee should be congratulated for blazing a trail and going on this far. It is a tremendous task. You receive all the criticisms. You are never given credit for the things you have attempted to do. I believe it would be a good thing if we would accept this as it stands and then have this matter go on into working operation, as the gentleman has proposed there; and we will absorb all these things and have a real Code in a year or two. Fellows, you have a ten-year proposition on this thing to get it right, and I do not want these young men to feel discouraged about any letters that have not been answered. It is not because we are not with you. It is because we have not had the time to reach it.

Mr. Altman: That is a very good suggestion. At last I am getting some encouragement on account of criticism, I am feeling encouraged. I would keep on ten years longer to work this thing out.

Mr. Sandel (National Safety Council Headquarters): Any fellow who has been in association work is not a bit ruffled by any criticism. You cannot phase us a bit. We are hard-boiled when it comes to criticism. My work has been slashed right and left; and as secretary of the Code Committee I do not feel discouraged; in fact, I am glad to see an expression in regard to it.

Now, as to Mr. Lundrigan's question: The Code Committee is more or less a permanent organization. Even though we publish a code we would still retain our status as an organization, receiving criticisms and retaining them until such time as a second edition was published. The Boiler Code Committee of the American Society of Mechanical Engineers is a permanent committee, and this Code Committee is likewise.

I do not think that our work is quite done yet. We would be glad to continue this for another year. As secretary, the bulk of the work of the committee falls on me; but we should be glad to continue it because we want a real honest-to-goodness job covering mills of all kinds in the United States and Canada.

Mr. J. A. Dickenson (U. S. Bureau of Standards): I have been in pretty close touch with Mr. Sandel on this work. I have probably been one of his hardest critics. I hope I have done some constructive work on it, though. The two points that have been brought in—the point I myself had intended to bring out—was the need of considerably more work on the paper mill end of the job. The work is fairly well divided. There are, as the gentleman from Holyoke said, hundreds of mills that buy their raw pulp and start to manufacture paper, or else make their paper direct from waste. The section out around Kalamazoo, Michigan, is a fine example of that. I have done a lot of work for the insurance companies in that section. Those fellows pick up the Code and find their work is covered in half a dozen paragraphs; and as they glance over the section covering the manufacture of pulp, the disparity in the amount of material in the two branches is very striking. They quite naturally feel that their particular phase of the work has been slighted in favor of the pulp making, and it would seem as though a couple of meetings primarily on paper making would be a good thing, dropping your pulp, because I think the pulp is in fairly good shape now, with possibly a few minor changes; but if we could hold one meeting in Kalamazoo and another around Holyoke, in the east, to cover the book and writing paper mills, in the course of the next four or five months, I believe we would, by spring possibly, be ready for the job; certainly well before the next annual meeting. But I think the main problem so far has been to get the interest of the mill owners in the thing. As soon as they get printed copies out and get them out into the mills, they will have a lot of suggestions. I have been through the same thing in the saw mill code. For two years we could not get a bit of criticism, and then we got out the printed mimeographed copies and we got a lot of criticism. Until you get that criticism you are not going to have a finished code. It seems to me that now arrangements could be made for a couple of meetings with the paper manufacturers and you could pretty quickly clean that up.

PLANS FOR COMPLETING CODE

Mr. A. S. Wilson (American Writing Paper Co., Holyoke, Mass.): Unfortunately this is the first time I have seen any of these, but I can easily see there is very little mentioned on the finishing end of it. A lot of our accidents come through the machine room and the platers and finishing room; and I feel that we might have a session on this latter end of it, and I think perhaps it might be a good idea. I just offer it as a suggestion.

Mr. Rosebush: Would it be possible for this code, as it is now made up, to be printed in a little booklet, embodying the suggestions made here today, and we in turn send it to all the mills, with places in this little booklet for addenda, so those who get them could write in their criticisms and send it to this committee; and after all the information is gotten together, put it into the hands of the various mills and ask them to send in their criticisms; but not close the thing up until another year has gone by?

Mr. Altman: There is one objection to that suggestion and that is the expense of getting it out. The National Safety Council is standing all of these expenses, and I do not think they would care to put this out in booklet form and still not have a complete code.

Perhaps we have not been getting these things from the right people. Mr. Wilkinson had two or three of these copies and we asked him for criticism, and he has written us a nice letter saying that the code seemed to be very good and complete. If we are getting the code into the wrong hands we want to find that out, so we will get it into the hands of those who will get it right. If we have a meeting at Holyoke and have a combination of the findings of the two meetings brought together, we might be able to come to some conclusion.

Now then, what is the consensus of opinion as to having a meeting tomorrow and going over this paper department and getting sort of a skeleton idea and then sending that skeleton idea to these people who are going to the meeting; or would you drop the matter again, the way it has been done before, and as it has been dragging along for four years?

Mr. Dickenson: I have a concrete suggestion, and that is that a number of the men here, who have volunteered to give information, but who state very frankly that they are not in position to do it now, get in touch with some of the committee today or tomorrow and outline the machine processes which they believe should be covered, and which they say are not covered; and then also get from them a list of the mills in their vicinity, with which they are working, that would be interested in such a code, and send out this skeletonized outline with a call for help, and say "We want material on these processes—the names of the machines or processes that have been outlined—and we want a set of rules." Then if you call a meeting in three or four or five months, the man can come with a definite list made up for that department.

Mr. Altman: Then if that is the case the proposition would be to hold a meeting of only those who have offered aid and who can aid us, even though they have not offered it as yet, for say tomorrow morning at 10 o'clock. If anybody has not spoken, and can give us aid, let him be around tomorrow morning at 10 o'clock in Parlor D. Let us take advantage of this wonderful enthusiasm. If you can get anybody else to come, who can give us some suggestions, please bring him along.

Mr. Sandel: We want everybody who is interested in this Code to come in and meet with us to morrow in Parlor D, so we can whip this into shape. The more criticisms we have, the better. If we can get down there tomorrow morning at 10 o'clock, we can accomplish something.

Mr. Rosebush: I make a motion that the paper and pulp section express its appreciation to this committee for the work they have done and ask them to continue in this work.

The motion was seconded and unanimously carried.

Mr. Costigane: I would like to offer thanks for the support given these gentlemen here this morning. This is the first time I have ever seen such support given, and I think they should be thanked.

The motion was seconded and unanimously carried.

PAPER AND PULP MILL HAZARDS**ROUND TABLE DISCUSSION**

Chairman Gleason: We have one more subject on our program this morning, and that is "A Round Table on Paper and Pulp Mill Hazards, Including Prevention of Slipping on Wet Floors and Safe Handling of Material." Now, we would like to have a discussion from anybody present on the first subject. Has any one something to offer?

Mr. Bush: I would like to find either a non-slippable floor, after you soak it, that is within the ordinary paper mill purse to install, and reasonably economical to maintain; or, failing in that, I would like to know what you can put on the bottom of the soles of your shoes to attain the same result without undue expense to the worker. I have not been able to find anything that covers that question yet, and I would like to find it somewhere.

Mr. Rosebush: In our mills we have a combination floor that does very well. I do not know as I can describe it very accurately to you. A diagram of it would look like a two-inch mesh wire. It is made of cast iron and in sections $2\frac{1}{2} \times 4$ feet, probably $1\frac{1}{2}$ or $1\frac{3}{4}$ cast iron. That is laid in the floor and cement poured over that. When first finished the floor is perfectly level, but in time the cement wears away, leaving this cast iron matting and leaving the floor rough. We have found that to be a very good floor. It does not absolutely prevent slipping, but we have found it to be a very good floor for a paper mill.

Mr. Coffey (Hammermill Paper Co., Erie, Pa.): Do you lay iron plates over the old wooden floor and fill them with cement?

Mr. Rosebush: The plates are put in first and the cement poured over. The cement will wear faster than the steel, leaving it a little bit rough, but still in shape so that it can be walked over.

Mr. Coffey: Some of the mills have a heavy wooden floor laid, and they lay the iron plates over the wooden floor.

Mr. Bush: This gentleman wants to know when you lay that kind of a floor do you take these iron plates and lay them on top of the wooden plank and fill in between with cement?

Mr. Rosebush: Yes, it can be done that way; or it can be laid just as you would lay cement; but the iron or the steel, of course, is at the top of your cement floor. It can be laid as you suggest.

Mr. Shepherd: At the Eastman Kodak Company we furnish the men with wooden shoes, and the men must keep a piece of belt at the bottom of it.

Mr. Wilson: Might I ask this gentleman in just what department you wear these wooden shoes?

Mr. Shepherd: In the beater rooms and in other rooms where they are washing up. In the beater rooms they wear them all the time, and in the boiler room. I am finding now they are commencing to wear the wooden shoes nearly all the time, and they like them better than their own shoes.

Mr. Wilson: They do not cause the feet to blister?

Mr. Shepherd: No. They go up to the rag room and select a nice rag, and instead of wearing a stocking, they put a rag around their feet and do not put on their stockings until they get home at night. We have had several accidents on account of slippery floors, especially in the beater rooms; and they have helped us wonderfully.

Mr. Wilson: Do they wear them around dry rooms?

Mr. Shepherd: They are not supposed to, but we find that they like them and wear them. We do not want them to wear them in the dry rooms because they are expensive.

Mr. Bush: Where do you get them?

Mr. Shepherd: I do not know, but we have them in stock, and when a man comes in we give him these shoes along with the job, and when the uppers wear out we give him another pair.

THE WEARING OF SPECIALLY MADE SHOES

Mr. Wilson: We find difficulty in getting the men to wear shoes. They are used to working in their bare feet. We asked them if they would wear shoes, and some of them would and some of them would not. With their bare feet they tell me they have a chance to grip and hold on, and do not slip. One of the men had his first accident since he has been wearing shoes. I have hesitated, for that reason, in insisting that they wear shoes. That may be a condition of a fine mill.

Mr. Shepherd: I do not think there is any finer work than making photographic paper. Those days are gone by to a certain extent, and with slower-running machines it seems to me the boys like to wear the wooden shoes.

Mr. Bush: If that belt does any good on a wooden shoe, why couldn't you put it on an ordinary shoe and get away with it?

Mr. Shepherd: The wooden shoe is pretty light. If you put that on an ordinary shoe he has a load to drag around with him all day.

Chairman Gleason: Is there not a plan followed out of leaving the concrete floor in a roughened state and not finishing it off?

Mr. Coffey: We put some iron chippings in.

Chairman Gleason: The iron chippings are sprinkled in the cement when it is laid.

Mr. Miller: We have a mill of 265 employees, and in the reconstruction of the mill we are putting in all concrete floors. In the finishings we use a very fine grade of gravel. That is at all times smooth; but in the beater rooms and machine rooms we have those cast iron plates, with those drilled holes in them, and I daresay we have not had one accident of anybody slipping and falling and hurting themselves on that floor in the last five years. It has really proven a success. In our machine rooms the floors are all cement, the wet ends and all. The drainage there is very slow. There is a slope to the floor and it does not remain moist and wet very long at one time. We have not had any accidents within the last five years from anybody falling. The men all wear wooden shoes.

Mr. Coffey: The floor is sloped towards the machine?

Mr. Miller: Yes.

Mr. Shepherd: I would like to ask that gentleman if he uses any animal size?

Mr. Miller: No.

Chairman Gleason: The next is "Safe Handling of Material." Surely some of us have trouble on that score.

Mr. Bush: The biggest thing we have found in connection with accidents in the handling of material is the educational feature. When it comes to mechanical protection and mechanical devices to protect against hazards in the handling of material, we have not been able to get very far. The chief thing in regard to that is the care of the individual, and we feel that the one great step that we have made in trying to counteract that hazard was that same question I spoke of in my paper: physical examination. If you are going to put a man into that kind of work, of handling material—and especially heavy materials, such as bales of rags and pulp—that factor of knowing that the man you put on that job is not physically handicapped in some way before he tackles the job is a very great preventative. Even then, of course, things do happen; but not so much as is the case when you just pick up anybody and send them to work on that job, and in half a day you have a serious hernia case on your hands, or something of that kind.

Mr. Wilson: I think one success we have had—we have not gone very deeply into the safety work; we have always had our organization there, but it has been rather a matter of form, to comply with the insurance companies' regulations—but I find we have a lot of accidents on our platform, and I find that a good level-headed foreman, who will not let the willing fellow do more than his share, and not have a lot of shouting "Come on and let's get it done!" will help the situation. A little too much hurry will sometimes cost us more than half the profit that we are going to get out of the job. It takes time, and time well spent—busy, but not overrushed—will pay well in the end. As Mr. Bush said, I think education will help a lot. In our finishing room, instead of a man taking hold of a large sheet and trying to swing it onto a case, let two of them do it.

ATTRACTING THE ATTENTION OF THE WORKER

Mr. McConnell: Over at the Falls we have quite a large foreign immigration. We have about 58,000 people, and when we took the census in 1918 we found there were twenty-seven thousand and some odd hundreds of English-speaking folks and the remainder of that population was foreign born; so there were a great many things to be considered.

Now, I found out from my own experience, after fighting for two years to get a bulletin board in the mill—I started in with the baseball score, in the fall of the year, when everybody's attention was called to the big league game, and we got some attention; and in a year's time we were able to convince the people that one should be placed in each department. We now have eight bulletin boards. I found it was quite a task to get their attention drawn to reading them. We have lots of boys up to 18 and 19 years of age, and I found, in investigations among those boys—and sometimes the girls—that the average youngster has not reached, in school,

farther than the sixth grade; and you have to use methods of approach along the line of the fellows in the newspapers—the funnies—and I began to select these funny pictures and the movie stars. I selected Douglas Fairbanks, for instance; and I would put it alongside of the message and put that message over. After a year's time we ventured with one letter sheet and tried to hold their attention that way. Finally, one day, I got out a letter "How many successive days can we go without an accident?" and we sent them around and found a percentage of the fellows would read them. Then I got thinking along those lines more deeply, that where a man's pocketbook is, his heart is. Then I got talking to one of our men and he said: "Why don't you make use of the time card?"; and it struck me that the time card was the next thing to a man's pay envelope. So we have a different message on those time cards. We place them on the time cards with a clip, and every individual will get a message; and I have found out from experience that they will read them. Now, in 13 out of 16 ventures I have never found these papers lying around outside of the door of the mill, and it shows you that these folks will read those messages if you will take the time to reach them in that method, through the time card, by clipping the message on with a clip. One of our messages on safety is: "How many successive days can we go without an accident?"

Here is another: "To be safe, think safely."

There are a lot of fellows who are always broke. Here is one for them: "I am a bank book." We got 18 fellows to come in and open an account through a building and loan association, which we run through the time office.

Along about May we had a Boy Scout movement. We went out to get \$15,000.00 through the citizens. So we had on at that time this note: "Everybody likes a good scout." It appealed to the average man, who has been a boy some time. That drew \$100.00.

Here is another, "Good rules for employees." I picked out what I could and put it all together.

Then we got around to this situation of finance again, where I found a fellow touching a neighbor for a five or ten spot and failing to pay it back, and it came back to me. So I got out this one: "Broke."

Then here is one: "The work game is more interesting than any other game once you learn to give it your interest."

This little piece of paper (indicating) brought 21 people into the pay office, who gave us permission to deduct from one to five dollars from their pay every week. It reads like this: "Pay day! That sound goods. When you come out of the barber shop with a peachy haircut and shave, and you go home for a bath, ain't it a swell feeling? What made this change in your appearance and feeling? A little work on the part of the barber. He was interested in a clean-up job and he did it. It pays. Try it with your work and see how much easier things go when your machine is clean. Clean out your locker and your machine and start the habit of wearing clean, fresh overalls on Monday morning. Gee! what a change will come over the mill." We cleaned two carloads of dirt out of the mill on that day as the result of this note.

I found out from studying the matter that you never could put those things on the time card going out because the fellow is thinking about getting his dinner or catching his car outside. I found also that you cannot put them on Monday morning. On Monday morning he is blue. But Tuesday is a good day. You cannot reach him on Thursday because he is thinking of Friday and Saturday. You cannot reach him on Saturday because he is a millionaire; but he will read it on the company's time and it will help you. It has helped us. After the second letter we cleaned up six carloads of dirt and it cost us \$800.00 to get rid of that mess.

Mr. George V. Cooper (York Haven Paper Co., York Haven, Pa.): We have pamphlets, signs and so forth, where every man can see them; and then "Dollar Safety Meetings" are held and various matters discussed. These signs are printed on a green background, with yellow letters, and it makes a good advertisement.

EIGHTY PER CENT OF ACCIDENTS DUE TO HANDLING MATERIAL

Mr. George E. Ames (Falulah Paper Co., Fitching, Mass.): I want to say that this question of the handling of material is a great question. Last year we found that 20 per cent of our accidents were traceable to the machines and so forth, and the other 80 per cent were due to the handling of material. I think that is largely due to the foreman not properly explaining to the men the dangerous parts of the job; and I have worked out with the foreman some things that he is to tell them, and also go with him and not pass the buck to some sub-foreman, with the result that in the last five months of last year we had 17 lost-time accidents, and in the first five months of this year we had 8. I think it is working out.

Another great benefit to us has been an accident clock, made something like five feet in diameter, and with numerals running from 1 to 20. When a man has a lost-time accident the hands move; and it is perfectly amazing what an interest the men take in that clock. When the hands move, the fellows go out and say "Who is hurt?" It is set out with electric lights on it, so it can be plainly seen; and as they come out through the finishing room, that is before them continually. I think that accident clock has done wonderfully well.

Mr. F. A. Robinson (Kimberly Clark Co., Niagara Falls, N. Y.): We have installed a system whereby if the department goes 100 years without an accident—counting up the aggregate time of the men in arriving at the hundred years—if it goes that length of time without an accident, each man gets \$5.00.

Mr. Wilson: I find we very rarely get any good bulletins on the pulp and paper industry. Now, is it possible that amongst our paper mills we cannot get something original, or is it because they do not go after it hard enough? We want something applying to the pulp and paper industry. Those we put up have not the slightest bearing on our industry.

Mr. Bush: We are to blame because we do not get after them.

Mr. M. G. Hoyman (Kimberly Clark Co., Neenah, Wis.): We sent possibly 170 letters, to every paper mill we could get the name of, to ask

them for help in getting out these bulletins; and I have the honor to report that about six out of that number answered. That is the reason you cannot get any bulletins.

Mr. McConnell: Having bulletin boards, I have taken care of a lot of material, and I have discovered that the International Paper Company has some one connected with their Maine plant, and that fellow has the knack of sketching, for example, a man just overstepping the boundary, like a man reaching over a tank and about to take an everlasting swim. If you could get such a man I think it would have a good result.

I think the bulletin service that is provided for in the National Safety News is splendid, and it applies pretty nearly 100 per cent to the paper and pulp mills.

On this handling of material proposition—I do not want to make too much of a nuisance of myself on the first visit—but I think one of our important weaknesses is our failure to get the whole business of properly looking after this matter before our foremen, our supervising man in charge of that particular department. I do not think he has been fully and thoroughly imbued and educated up to the proposition. I think that one of our vital and important duties is to see that a new man understands the character of the work he is to do, or that somebody is provided who can teach him. Men will often practise self deceit in order to secure a position or a transfer to a more desirable position; therefore, you cannot trust to the judgment of an individual employee that he can do that job. If you simply take his word you may be mistaken. The inexperienced man is usually the contributing cause of injuring some one else. He does not know how to use some mechanical appliance or he does not understand the exact operation of an automatic machine, or something of that sort. Then there is another very important element that you ordinarily cannot, and should not, depend on the individual workman to perform—at times it is perhaps beyond the real responsibilities of the supervising foreman—and that is a careful and frequent inspection of tools and equipment and all kinds of mechanical appliances that are utilized in the handling of material. It is almost beyond belief, the number of serious accidents that are caused in an industry like the business of manufacturing paper, on account of the use of defective hand tools, such as hammers and chisels with mushroom heads and that sort of thing, emphasized by the failure to use goggles.

RUNWAYS AND PLATFORMS

Another cause of accidents that might be classed with maintenance is the failure to provide overhead working places—runways and platforms—and particularly temporary staging where replacements and repairs are going on, where men are not usually at work. We keep a detailed history of all of our losses from accidents, and we can trace almost to a certainty the cause of some of them. When we check up these figures we are astonished at the number and percentage of serious losses from accidents that occur entirely aside from, and separated from, any such thing as the operation of a machine. I think that out of some 230 accidents during

the last quarterly period we had 128 that could not, by the widest stretch of the imagination, be tied up with the moving part of the machinery. I have not the exact figures, but I think there were upward of 40 caused by dropping material; and we all know, as we pass back and forth through paper and pulp mills, that there is so much material dropped when, thanks to Providence or good luck, no one is passing beneath. If we included in there all the cases where a person was not hit when anything was dropped, it would bring that total up.

Chairman Gleason: I would like to announce that the Nominating Committee have suggested the following:

Mr. G. W. Phillips, Chairman.

Mr. F. H. Rosebush, Vice-Chairman.

Mr. S. L. Bush, Secretary.

Mr. Bush: Mr. Chairman, I very much appreciate that honor, but I would greatly prefer to have my name left off and the name of some one else put on. I am tied up so much with so many outside things that I am afraid I would not give the proper attention to the duties of the office. I appreciate the honor, but you do not want me on there for Secretary. I would not do anything.

Chairman Gleason: Do I hear a motion that the nominations be closed?

Mr. Lundrigan: I make that motion.

The motion was seconded.

The motion was unanimously carried.

ROLLCALL

Mr. W. A. Gleason, Hammermill Paper Company, Erie, Pa.

Mr. W. J. O'Reilly, Canada Paper Company, Quebec, Canada.

Mr. David S. Miller, York Haven Paper Company, York Haven, Pa.

Mrs. David S. Miller.

Mr. George V. Cooper, York Haven Paper Company, York Haven, Pa.

Mr. Robert M. Altman, Marathon Paper Mills Company, Rothschild, Wis.

Mr. Hugh P. Baker, American Paper & Pulp Association, New York.

Mr. Robert G. McConnell, Defiance Paper Company, Niagara Falls, N. Y.

Mr. M. C. Michael, F. N. Burt Company, Ltd. (Drake Process, Buffalo, New York).

Mr. C. L. Neurnberger, F. N. Burt Company, Ltd. (Drake Process, Buffalo, New York).

Mr. A. P. Costigane, Ontario Pulp & Paper Makers Safety Association, Toronto, Ont., Canada.

Mr. F. A. Robinson, Kimberly Clark Company, Niagara Falls, N. Y.

Mr. Jim Myers, Kimberly Clark Company, Niagara Falls, N. Y.

Mr. Oscar Nelson, Kimberly Clark Company, Niagara Falls, N. Y.

Mr. Frank Derks, Kimberly Clark Company, Niagara Falls, N. Y.

Mr. Herbert Stark, Kimberly Clark Company, Niagara Falls, N. Y.

Mr. Frank Kerwin, Kimberly Clark Company, Niagara Falls, N. Y.

Mr. F. H. Rosebush, Neboosa-Edwards Paper Company, Port Edwards, Wis.

Mr. F. A. Hasse, Corn Products Refining Company, Chicago, Ill.

Mr. John W. Shepherd, Eastman Kodak Company, Rochester, N. Y.

Mr. Earl M. Cugler, De Graase Paper Company, Pyrites, N. Y.

Mr. W. H. McDonald, Sears Roebuck & Company, Chicago, Ill.

Mr. F. M. Webster, Canada Paper Company, Ltd., Windsor Mills, Ind.

Mr. R. H. Cochran, Champion Coated Paper Company, Hamilton, Ohio.

Mr. T. F. McNutt, Ocean Accident & Guarantee Corporation, Syracuse, New York.

Mr. T. R. Stilp, Kimberly Clark Company, Inc., Niagara Falls, N. Y.

Mr. M. G. Hoyman, Kimterly Clark Company, Inc., Neenah, Wisconsin.

Mr. J. C. Youmans, Employers' Mutual Liability Insurance Company, Wausau, Wisconsin.

Mr. Al. Kroes, Employers' Mutual Liability Insurance Company, Wausau, Wisconsin.

Mr. Dan Stacy, United States Gypsum Company.

Mr. F. M. Singer, United States Gypsum Company.

Mr. A. S. Wilson, American Writing Paper Company, Holyoke, Mass.

Mr. Jas. H. H. Ballan, Ontario Department of Labor.

Mr. J. Robertson, A. S. L. of A., Westerville, Ohio.

Mr. H. B. Sowers, American Issue Publishing Company, Westerville, O.

Mr. E. J. Lawlor, International Paper Company, Niagara Falls, N. Y.

Mr. W. Farr, Paper Converting Corporation, Niagara Falls, N. Y.

Mr. C. E. Sterner, Paper Converting Corporation, Niagara Falls, N. Y.

Mr. E. G. Crissery, Paper Converting Corporation, Niagara Falls, N. Y.

Mr. C. T. Buss, Provincial Paper Mills, Thorold, Ont.

Mr. P. M. H. Cushing, Provincial Paper Mills, Thorold, Ont.

Mr. R. D. Staumpre, Aetna Life Insurance Company, 211 Union Building, Syracuse, N. Y.

Mr. John Lundrigan, International Paper Company, Pershing Square, New York City.

Mr. Samuel Pruyn, Finch Pruyn Company, Inc., Glens Falls, N. Y.

Mr. Wilson W. Ritter, State Workmen's Ins. Fund, Harrisburg, Pa.

Mr. Charles E. Lynch, International Paper Company, Pershing Square, New York City.

Mr. John F. Gibson, Esleeck Manufacturing Co., Turners Falls, Mass.

Mr. George E. Ames, Falulah Paper Company, Fitchburg, Mass.

Mr. Thomas C. Eipper, State Department of Labor, New York City.

Mr. G. C. Daniels, State Labor Department, Albany, New York.

Mr. W. P. Coffey, Hammermill Paper Company, Erie, Pa.

Mr. G. W. Phillips, The Champion Fibre Company, Canton, N. C.

Mr. R. W. Hale, Michigan Mutual Liability Company, Detroit, Mich.

Mrs. R. W. Hale, Michigan Mutual Liability Company, Detroit, Mich.

Mr. E. D. Vattiere, Michigan Mutual Liability Company, Grand Rapids, Michigan.

Mrs. E. D. Vattiere, Michigan Mutual Liability Company, Grand Rapids, Michigan.

Mr. Seth L. Bush, Manager of Research, Crocker McElwain Company and Chemical Paper Manufacturing Company, Holyoke, Mass.

Mr. M. W. Reynolds, Plant Nurse, International Paper Company, Niagara Falls, N. Y.

Mrs. P. I. Ostrander, Supervising Nurse, International Paper Company, Park Avenue and 42nd Street, New York City.

ADJOURNMENT

Petroleum Section

October 2 and 5, 1923

ROY S. BONSBIB, Chairman

Standard Oil Company (New Jersey), New York City

D. J. WALLACE, Vice-Chairman, Producing Division

Humble Oil and Refining Company, Houston, Texas

R. O. VON THURN, Vice-Chairman, Pipe Lines Division

Cosden Company, Tulsa, Okla.

E. J. SENNE, Vice-Chairman, Manufacturing Division

Vacuum Oil Company, New York City

E. S. ESTERLY, Vice-Chairman, Marketing Division

Atlantic Refining Company, Philadelphia, Pa.

V. R. CURRIE, Secretary

The Texas Company, Houston, Texas

TUESDAY MORNING SESSION

CHAIRMAN BONSBIB: The Petroleum Section is three years old today and it is getting to be quite a healthy child. The work has progressed very nicely under the efficient efforts of the various chairmen, and I think that the best way of letting you know what has been done is to let the vice-chairmen themselves tell you.

REPORT OF MANUFACTURING DIVISION

E. J. SENNE, VICE-CHAIRMAN

Your vice-chairmen have been ready at all times to take up whatever questions were presented and to give the benefit of their experience and advice in any safety matters referred to them. Their principal object has always been the maintenance of such standards which would prevent accidents and to devise such plans as would at least minimize accidents, thereby saving to the individual suffering, loss of time and consequent misfortune to his family and saving to industry a competent worker, who can in these days hardly be spared.

I have tried to do my full share in the work assigned to me and was ever ready to render the best service possible and I can only reiterate

that seemingly the Petroleum Section is fortunately endowed with competent and efficient safety men, who have helped themselves and found their own relief for the problems which may have confronted them without invoking the aid of your committee.

I congratulate the members of our section for so fine a spirit of determination and self reliance and hope for the continuance of a record of which we can all be proud.

REPORT OF SECRETARY

V. R. CURRIE

I am glad to report that during the last twelve months you have shown a gradual increase in the membership of both the Petroleum Section and of the National Safety Council. During the year three oil companies dropped their membership and we took on eleven new members. We today have 52 memberships in the section.

The secretary undertook at the last meeting to endeavor to improve the bulletin service. I immediately sent out letters and some of the members were very prompt in sending in material, but evidently the matter fell down and I think that on the bulletin service, so far as the Petroleum Section is concerned, the past year has been almost an utter failure, and it would be my recommendation at this time, to the new officers, that a good lively bulletin committee consisting of at least three members be appointed to look to that particular service.

REPORT OF PRODUCING DIVISION

D. J. WALLACE, VICE-CHAIRMAN

The activities of the producing division have been very limited, but nevertheless much good has been accomplished and the effect of the safety thought is becoming very marked in many fields. Guards around engines, clutches, gears, and belts have become the rule rather than the exception in the Gulf Coast fields, and safety is becoming a more vital part of the field operations.

The use of safety hooks and elevators is becoming common and it is encouraging to find the manufacturers of oil field equipment ready to co-operate in the safety movement as evidenced by the new block, draw works, etc., put out and the guards which many manufacturers are including with their equipment.

The elimination of the fly-by-night operator will make our work much easier, because it is never possible to interest this type of man in safety, while on the other hand, the executives of the legitimate companies almost without exception show a very real interest in the safety and welfare of their employees.

I feel that a real effort on the part of those of us who are members of the National Council toward getting others to join with us, would result in greater good to the industry than could be obtained in any other way and would incidentally make the National Council of much more value to us all. We certainly owe this to ourselves as well as to the industry at large.

(The foregoing reports were accepted on vote of those present.)

APPOINTMENT OF NOMINATING COMMITTEE

Chairman Bonsib: The next thing on the program is the appointment of the nominating committee. The success of the Petroleum Section depends upon your officers as well as the cooperation of everybody in it, and I want to appoint on that committee.

Mr. E. A. Timm, of the Standard Oil Company of New Jersey.

Mr. F. S. Evans, Atlantic Refining Company.

Mr. Wm. V. Winslow, of the Texas Company, New York City.

Mr. J. M. Steffen, of the Standard Oil Company of Kansas.

SAFE PRACTICE OF ACETYLENE WELDING AND BURNING IN AN OIL PLANT

E. A. TIMM, SAFETY INSPECTOR, STANDARD OIL COMPANY, BAYONNE, N. J.

Acetylene welding has proven superior to electric welding in that the electric arc has a tendency to crystallize the weld, but for cutting, Bu-Tane will eventually replace acetylene.

Bu-Tane is a clear colorless mobile liquid with a specific gravity of 100° to 115° Baume at 32°F. Its heating value is approximately 3000 B. T. U.'s per cubic foot and the theoretical ratio of combustion is four parts oxygen to one of Bu-Tane. This gas is a product of the gasoline absorption plants and one gallon of the liquid yields 8¼ feet of vapor per pound. The liquid weighs approximately five pounds to the gallon and there are eight and a fraction gallons in each cylinder, giving 330 cubic feet per tank.

With this ratio of combustion approximately seven cylinders of oxygen would be used in consuming one tank of Bu-Tane, but actual practice has demonstrated that from 25 to 32 tanks of oxygen were used before one tank of Bu-Tane was consumed, giving a combustion ratio of 20 to 1. Therefore this gas in comparison with acetylene as regards cutting operations is more economical. From five to eight times more cutting can be accomplished by using Bu-Tane and the relative cost per cubic foot is about equal to that of acetylene.

Under the rules of the Interstate Commerce Commission Bu-Tane is marketed in seamless steel cylinders similar in all respects to oxygen cylinders having a fusible safety plug on top of the tanks.

GENERATION OF GAS

The interaction of carbide and water produces acetylene and the function of a generator is to bring these two substances together in such a way as to produce a cool clean gas and if this is accomplished the probabilities are that the machine is safe.

There are three general types of generators which may be classified as follows: (1) water to carbide, (2) carbide to water, and (3) the recession type.

There is a considerable element of danger in the water to carbide and the recession types of generators due to an accumulation of sludge.

Acetylene cylinders are manufactured to comply with the rigid specifications of the Interstate Commerce Commission and there is hardly any probability of danger from this source as long as they are handled correctly and not subjected to abuse.

Oxygen cylinders present a more serious problem as they contain gas under a pressure of 1,800 lbs. per sq. in. Ordinarily they are thrown around the same as a piece of junk, but it is taking a long chance and is anything but safe practice.

The use of oil on cylinder connections should be prohibited it being unnecessary as they are of ball and socket type and require no further lubrications than soap and water. Allowing the men to use oil on acetylene connections has a tendency to breed contempt for the oxygen or the men may forget and place some oil on the oxygen connections with disastrous results. As you know, oil coming in contact with oxygen is a dangerous proposition and will cause an explosion of the regulator. An accident of this type occurred recently when a welder, doing some work in the tax plant, while changing cylinders removed his regulators and placed them on a board covered with wax. Some remained on the connections and when he opened up on the cylinder valve the oxygen coming in contact with the wax caused an explosion, bursting off the regulator. Fortunately no one was injured.

Extreme care also should be exercised by the operators to keep their tanks away from leaking oil lines and the necessity of this should be continually impressed upon their minds. In some instance, after the cylinders have been used, they are thrown down on the ground, regardless of its oily nature. Very often the cylinders are shipped back to the charging station covered with oil, making it necessary to remove the valve and thoroughly steam-clean it before recharging.

PIPES LINES

The size of pipe required for an oxygen pipe line depends upon the number of stations and the length of the line. When the line does not exceed 300 feet and the hourly consumption does not exceed 500 cubic feet, a $\frac{3}{4}$ " pipe will prove satisfactory. The extensions to the welding station should be of $\frac{1}{2}$ " pipe and the turns should be made of bent pipe rather than screwed joints.

A safety device should be connected to the oxygen line to guard against over-pressure in case of a faulty regulator. A thin brass disc can be clamped between two flanges, one of which is screwed to the end of the pipe line and the other flange bolted to the first having a capped nipple screwed into it that contains a number of drilled holes to act as a relief and also to guard against flying pieces of disc in case of rupture due to a defective regulator.

Acetylene Pipe lines are necessarily larger than those required for oxygen as the pressure of free acetylene should never exceed 15 pounds to the square inch. A one-inch line will service approximately 20 welding stations.

Black iron or galvanized pipe with welded joints can be used but copper tubing, pipe or fittings should never be used as acetylene in contact with copper forms copper acetylide, a dangerous substance which may explode with resultant disaster.

Between the line regulator and the line, stop valves should be placed making it possible to remove the regulators. Additional stop valves should be inserted in the line so that any unit may be cut off when necessary without interfering with the operations of other welding units on the same line.

It is absolutely necessary to protect acetylene pipe lines from back fire by means of water seals installed at each main and branch line. The gas bubbling readily through the water stops a back fire from entering the main line or generator and these seals should be regularly inspected and kept full of water.

EQUIPMENT

Hose—A poor grade of hose is an expensive investment and it is needless to say that the best grade obtainable is required to resist the handling and twisting incidental to the work and the resistance required to withstand the pressure of the gases. An inferior grade will disintegrate on the inside, clogging the needle valve and introduce impurities into the fused metal.

Metal covered hose is not recommended, first because of its weight and secondly that leaks are not easily detected or repaired.

Hose connections should be checked and a good grade of clamp used. It is also good practice to use a rubber cement or to shellac the torch and regulator connection nipples before attaching the hose.

Both acetylene and oxygen hose must be blown out occasionally to remove any dust or dirt that may be in the hose, which would clog the needle valves of the torch or cause a poor weld.

Torches—These are another part of a welder's equipment that require the best of care especially the threaded section of the head and the needle valve packing nuts. The latter should be screwed up tight enough to prevent leaking and care exercised not to burr the threaded part of the head or the tip seat.

The safety of operation is dependent upon the construction of the torches and the disadvantages of some torches are their flimsy construction, excessive weight and their tendency to flash back, but even the best torches obtainable will not last long unless they are given reasonable care.

The holes in the mixing chambers and tips are drilled to exact sizes and changing the size of these holes invariably leads to trouble.

If it is necessary to clean out these holes use a soft wire. The tips should be protected from injury as any irregularities in the discharge holes of the tips will effect the flame formation.

Back firing is caused by incorrect mixture and can be prevented by maintaining the gas pressure suitable to the size of tip used. A neutral flame will not back fire unless the gas is dirty or the job is a large one

causing an overheating of the torch. The latter can be taken care of by cooling the torch in a pail of water. Turn off the acetylene valve on the torch before plunging into the water allowing the oxygen to blow through to keep water out of the mixing chamber.

If a back fire occurs shut off the oxygen and then the acetylene. Before relighting, turn on the oxygen and blow out any carbon that may have accumulated.

Regardless of the fact that safety matches are used, it is more economical and safer to use gas lighters. If matches are used they should be placed on the ground or on some object instead of being held with the fingers. Serious burns have resulted from the use of matches and if the operator should turn on his acetylene too much, a long tongue of flame will result that may burn those standing nearby. The operators should be cautioned to keep their lighted torches away from their fellow workers, especially when shifting from one position to another and to keep their hose lines free from material that may fall on or be piled on top of the hose.

Regulators—A mechanic is known by the manner in which he keeps his tools. If an inspection is made of the bench drawers, in the majority of cases, you will find an accumulation of junk, wrenches, hammers, chisels and what not, thrown on top of tips and regulators. The regulator is a delicate piece of apparatus and requires careful handling. It should not be dropped or thrown around and care must be taken to keep the connections from coming in contact with oil or grease. Invariably the regulators are the most abused part of the equipment and generally the gauges fail to register correctly, being from 10 to 15 lbs. off. These conditions should not be tolerated and the head of the department should insist upon having the equipment maintained in good condition.

To prevent the oxygen regulator from being used on the acetylene or Bu-Tane cylinders, the oxygen tank connections are made larger with a male right-hand thread whereas the acetylene connections are smaller with a female left-handed thread and that on Bu-Tane is the same as the acetylene differing only in being a male right-handed thread making the use of an adapter unnecessary as the regulators can be screwed directly onto the Bu-Tane cylinder. This combination eliminates the possibility of connecting a regulator to the wrong cylinder.

In coupling the regulators to their respective cylinders, care should be taken to prevent the crossing of threads and if the nut fits too tight, a little soap and water should be applied to prevent freezing of the threads.

As there are no gaskets used in these connections, which depend on a ground ball and socket joint, it is necessary to keep these connections clean and before attaching to the cylinders, the joint should be wiped off with a clean cloth and not with dirty, oily gloves.

Detail procedure which should be followed when attaching regulators to either cylinder can be obtained from the National Safety Council Pamphlet No. 23 "Safe Practices, Gas and Electric Welding."

In the transportation of cylinders from one section to another it is good practice to provide a two-wheel carriage in which both cylinders can be strapped and the entire equipment conveyed from place to place. This truck is illustrated in the above pamphlet, but the wheels should be large enough to bring the axle above the center of gravity. In the less congested sections of the plant they can be used to advantage, but we find that it is more convenient to transport the cylinders by motor truck as near to the job as possible. Each operator carries his outfit which includes a one-quart fire extinguisher, to and from the job. His hand tools are periodically inspected by the plant inspector.

The cost of having this inspector on full time has more than paid for itself as the accidents due to hand tools have been reduced 90 per cent and the increased production due to tools in first-class condition can not be estimated.

PROTECTION FOR WELDERS

Eye Protection—In discussing the protection of the eyes from the various visible and invisible rays it may be of interest to know that from investigations of Aschinass, the transmission curve of the eye media is the same as that of a corresponding layer of water and due to the pressure of this water which is very opaque to infra-red rays but little radiations of wave lengths greater than 1.5 microns passes through the cornea.

It has been estimated that most of the energy (about 97 per cent) radiated from a furnace at 1000 to 1200° C. is absorbed in the outer portions of the eye. Injury caused by the infra-red rays therefore occur in the outer portions of the eye and appear to produce a thermal effect burn. When the infra-red rays encounter any material which they cannot penetrate or when it is opaque to them, they are absorbed and are changed into heat and are frequently but incorrectly referred to as heat rays.

Those of us who are responsible for the protection of the workers against the infra-red and ultra-violet rays should have a spectrum analysis made of the lenses used by the welders or to standardize on a lense whose spectral transmission curve has been determined.

The ultra-violet ray are not within the scope of this paper and therefore will not be considered except to state that they are principally to be feared, not only because they are invisible, but because we have no organ or sense for detecting them and can only trace their existence by their effects. Knowing of the existence of these rays it is not a difficult matter to provide proper protection as there are only a few substances which are transparent both to visible light and to ultra-violet radiations, such as clear natural quartz or rock crystal, Fluroite and Selenite, the latter two being rare and not in common use. A moderate thickness of ordinary clear glass, sheets of clear or amber mica and of clear or colored celluoid or gelatine are opaque to these dangerous rays. Therefore, it is not a difficult matter to protect the eyes from them.

Clothing—On all heavy work the operator should be protected from the heat radiations by the use of asbestos sheeting and his clothing should

consist of, in addition to regulation overalls or unionalls, a pair of fire and heat resisting gauntlet gloves and a split canvas or leather apron. Further he should securely fasten the bottoms of his trouser legs around the tops of his shoes by using bicycle clips and shoes having bellow tongue would prevent molten metal from entering through the lacings.

Woolen clothing is preferable to cotton because it is not so easily ignited and protects the workman from extreme changes of temperature.

Ventilation—Adequate shop ventilation is required by law in some of the states and care must be exercised when working on large jobs to protect the operator from carbon monoxide fumes especially when preheating within confined quarters. If it is impossible to do this work where proper ventilation can be had and the nature of the work is such that the preheating, welding or cutting must be accomplished within confined quarters, such as a condenser box, it is good practice to provide a fresh air type of hose mask for use of the operator, having the proper colored lenses in the face piece.

PRECAUTIONARY MEASURES

Chemical fire extinguishers and sand pails should be placed in convenient and easily accessible places in the welding shop.

When necessary to do any welding in the vicinity of an automobile gasoline tank, it is good practice to remove the tank before attempting to weld.

No matter how careful a welder may be there is a possibility of danger attempting to use a torch in a place where gasoline vapor is present especially when turning out carbon of automobile cylinders and the operator should use sheet asbestos to cover all oil soaked parts, gasoline supply line, vacuum tank and carburetor, and a fire extinguisher handy for instant use before attempting to do this work.

Gasoline Tanks, Drums and Steel Barrels—Before allowing any cutting or welding on containers, it should be definitely ascertained the uses to which such containers have been subjected. If they held combustible gases or liquids they constitute a serious source of danger.

There is only one perfectly safe and satisfactory method of removing combustible gas or oil vapor and that is to fill the container to overflowing with water thereby displacing any accumulation of gas or vapor and to steam out with live steam (60 to 70 lbs. pressure) for at least 30 minutes.

Gasoline steel barrels after being in service are sooner or later returned to the manufacturer for repairs. In all such cases regardless of the nature of the repair job it is absolutely necessary, for the protection of the repair man, to thoroughly flush with water and steam out with live steam before allowing the welding flame to be brought near the tank or barrel.

Formerly at one of our works the steel barrels were steamed and stacked in order to save time. It happened that a new employee not familiar with the procedure placed an unsteamed barrel on the pile and as the welder tested for sweetness by the sense of smell (this being

another precaution taken by the men) he detected the odor of gas and to be on the safe side he stood behind a heavy door and passed the lighted torch across the lung. Of course an explosion took place which blew the head forty feet into the air. In order to prevent a recurrence of a similar event the barrels are flushed out, stenciled and stacked, leaving the operation of steaming go until the welder is ready to repair them. They are then placed on the steaming manifold, to be taken off by the welder and repaired immediately after the steaming operation.

TYPES OF ACCIDENTS

Having access to the accidents reports of five oil refineries that cover a period of three years, certain conditions that existed at the time causing these accidents will be of interest to those in the oil producing industry. Following is a description of the accidents with the precautions necessary for the elimination of similar cases.

1. The stem of a non-return stop valve was bent and the acetylene operator was heating it for straightening by the machinists. This valve stem was made of cast brass and had been cored out having the cored hole plugged. During the process of preheating with the torch, the moisture in the hollow part of the stem expanded and the pressure eventually became so great that a weak section of the stem ruptured. Some of the flying particles of metal struck the operator in the face resulting in the loss of an eye. All mechanical parts that contain air or moisture within a confined space should have such spaces vented by drilling before applying heat regardless of the heating medium.

2. On a new tank construction job the burner was instructed to burn an angle iron hand rail for a stairway. All of our new tanks 30 feet in height and over have a break in the stairway and a landing is constructed at this break. The burner was working on this platform which was directly over a sewer catch basin. Some of the sparks during the course of burning fell into the catch basin and ignited the gas in the sewer causing an explosion. Fortunately no one was injured although the sewer was considerably damaged necessitating extensive repairs.

3. A case somewhat similar to the above but with more serious results took place at another of our works. Five men were detailed to disconnect a light oil line in a pump room under a condenser box. This line was at the rear of the pump room and the room had only one means of egress. Upon breaking the line, the light oil remaining in the line flowed on the floor of the pump room and out through the door, then down the road to a sewer catch basin that was approximately 50 ft. away. Just above and near this basin an acetylene burner was cutting and some of the sparks fell into the catch basin and ignited the oil. The flame followed the stream of oil back and into the pump room, trapping the five men in same. As the only means of egress was through the one doorway, it was necessary for them to run through the flames. This resulted in the death of two of the men. For the safety of employees all pump rooms constructed under condenser boxes should have two means of egress placed at opposite ends of the rooms.

Strict supervision should be made by the department head and proper precautions taken before allowing any welding, burning or hot work to be done and electric welding or oxy-acetylene cutting should never be permitted within a gaseous area. Work of this nature should be done a sufficient distance away from the source of the gas production and the direction of the wind must also be considered.

Sewer catch basins should be covered and ventilated. Unless this is done a gas pocket will be formed under the blanket making a tightly sealed catch basin an explosive hazard.

4. In another case while the operator was burning holes in the dome of a still, the pipefitters removed a gate valve allowing the gas to get into the still. The still flashed and the burner, in jumping from the scaffold, was slightly injured.

Before allowing any cutting or welding to be done on a still it is absolutely necessary to blank the light oil and gas lines off, and to flush and steam out the still.

Most of the accidents that are charged against and incorrectly termed acetylene explosions are caused, in the majority of cases, either by the lack of knowledge or thought in the handling or use of this gas or due to conditions arising out of extreme temperature of the flame acting upon certain confined elements, the expansion of which results in an explosion of the containers.

Minor injuries are in most cases the direct result of poor supervision or negligence of the operators failing to keep their equipment in good condition.

An accident was brought to my attention some time ago of a burner being killed while attempting to cut a steel plate that was resting on an oxygen cylinder under 1,800 lbs. pressure. In burning a hole in this plate he punctured the cylinder and an explosion resulted, instantly killing the burner. Just a lack of thought on the part of the operator who failed to observe what he was doing.

The majority of all accidents are caused by this lack of thought and lack of ability to sense the probabilities of being injured when performing their duties in an unsafe way.

There are very few thoroughly trained mechanics who are seriously injured because they have this sixth sense or ability to foresee the possibilities of being injured which is unconsciously developed during their training and oxy-acetylene operators are no exception to this rule. Therefore to decrease accidents among any body of men it is most essential that they be trained making them thoroughly familiar with their equipment and its operation.

Education and training, to my mind, is the only solution to this as well as to all other problems of accident prevention.

DISCUSSION

J. I. Banash (Consulting Engineer, Chicago): When I first handled regulators, I wiped out the oxygen connection with my fingers, until I

knew a little more about it, because when you are working in a shop you always have oil on your hands. A clean rag should be used; blow on the opening and wipe it out with a clean rag.

As far as using matches is concerned—most of the companies selling apparatus provide a pyrolighter, with a friction igniter such as you can buy in most department stores for lighting gas at home, and usually every equipment has one or two of those when you buy it. If they wear out you can get new tips. Where you are welding continuously at a bench, workmen usually use a small kerosene torch, and that sometimes saves a good deal of time or a little gas jet if your shop is provided with gas.

If you are preheating a casting, if you use charcoal instead of coke, you will find that the noxious gases will be very considerably reduced and you very probably will not have anywhere near the percentage of danger even in the same room.

The matter of storing oxygen and acetylene cylinders together is one that is well worth attention. In large shops where considerable volumes of material are used and storage facilities are provided, I think it is good practice to store your carbide and acetylene cylinders in the same room and have a separate room for your oxygen cylinders. Then you will have your combustible gas and the generator of combustible gas stored in one room, and your proper hazards concentrated there, and the oxygen in another room, and that will leave your third compartment, if you have that sort of an arrangement, for your generator.

Mr. Franklin L. Newcomb (Standard Oil Company of New Jersey): My experience has been with hammer welds and high pressure stills. We have a good deal of work that has to be done, especially in dismantling worn out stills, and we have had a great deal of trouble, but no serious accidents, due to coke which could not be removed from pipes and things inside of our stills. In burning out those pipes there have been very obnoxious fumes which bother the men considerably. A fresh air mask with the proper kind of lens in the thing so as to give these burners something to work with was furnished us for trial at one of our refineries. It was supplied with a light hose, about 25 feet in length which didn't inconvenience a man or hamper him in any way. The men were very much pleased with it, and in that case they welcomed a mask, whereas before we had had a great deal of trouble with the men to get them to use a mask on some of the other work. I believe that we cut down burning operations to about one-third of the time it took formerly.

IMPURE OXYGEN

Mr. Wallace: We had an experience down in Houston about two years ago, that was attributed to impure oxygen, and I would like to ask the gentlemen present if anyone has had a similar experience. There was hydrogen in the oxygen through faulty manufacture and that is what the explosion came from.

Mr. Banash: My recommendation and, I think, the recommendation of the Council's Safe Practices No. 23 is that all materials be purchased from firms known to be reliable and permanently and satisfactorily able to make that product.

Mr. Esterly: Some years ago we had one or more accidents wherein the oxygen or acetylene line, I don't know which, leaked inside the still while the men were working in there, with a resultant explosion. I don't think it was a serious accident at that time, but I have in mind that there was an accident which occurred either in a tank or in a still at one of the other refineries which was fatal, due to the fact that the hose leaked and caused a combustible atmosphere inside of the tank.

We use hand tools and, of course, machine tools, but we do not use oxy-acetylene cutting inside a still or inside a shiptank, or a storage tank in any confined space.

GAS MASKS

Mr. Senne: Mr. Chairman, our company has been very much interested in the proper type of gas mask to use. We have experimented for several years in endeavoring to find a suitable mask. It appears now that we have come across one we are satisfied is safe. It interested me so much that we practically adopted that mask.

Incidentally I want to call the attention of the members to a paper that was just published by the Government Serial No. 2489, June Reports of Investigations by the Department of the Interior, Department of Mines, making a comparison of gas masks, hose masks, and oxygen breathing apparatus. It is one of the most comprehensive papers I have ever read on gas masks.

Mr. Newcomb (Standard Oil Company of New Jersey): We had tried a great many hose and found that every hose on the market, after about five or ten minutes service, when lying in an oil, allowed gas to come through. They were impervious to the gases as long as they were not in the liquid but when they lay in the liquid a man started to breath gas. We have, however, found one spiral hose that is impervious.

Chairman Bonsib: I want to say that in the repair of condenser boxes it has been found that if you have a manhole at the bottom and also start circulation with a fan, it reduces greatly the danger of gasing in case of leaks in the line. There have been several accidents due to that and I think that that is something worthy of consideration.

Mr. Newcomb: We have been working up an emergency case to be set on top of condenser boxes for rescue purposes. We are using for that purpose at the present time a box fixed up for demonstration purposes. It contains a small fresh air respirator which simply covers the nose and mouth, with an aluminum nose and mouthpiece, with a rubber flutter valve and a light belt, also twenty-five-foot length of hose, all of which we have hung up in this box ready for use. The respirator fastens on with a very simple headpiece that no man can miss. In addition we have a blanket and about a hundred feet of rope in that box so that we have this material on top of the box to take care of any emergency. We don't recommend that small respirator for any work

at all except to rescue a man, or other emergency work. If you want to get something in a hurry, it is very easy, simple to apply and anyone without instructions can use it. It is there as an emergency box and we are planning to put them on all of our condenser boxes at regular intervals.

Chairman Bonsib: Mr. Esterly, will you please tell us what you know about the Prone Pressure Method of resuscitation?

PRONE PRESSURE RESUSCITATION

Mr. Esterly: Several years ago we had several men asphyxiated in a tank. As a result of that the management of our company asked me to see what we could do about it. We got in touch with the Bureau of Mines and found the Schaeffer Prone Method was the proper thing. Of course the prevention is the proper thing in all cases, but where the men have been overcome by gas or noxious fumes, we use the Schaeffer Prone Pressure Method. In our plant at Philadelphia we have about 400 men who have been taught the Schaeffer Prone Pressure Method and those men are scattered among the shifts and are taught at least every three months. That is to say, they are given a two-hour session in classes of five to six men by our safety instructor, Mr. Brown, and those men are practically letter perfect in the Schaeffer Method.

In the last three years we have resuscitated 23 men who were overcome under various conditions, and who would undoubtedly have died if they would not have been resuscitated in the proper manner.

Dr. Stein (The Philadelphia Gas & Oil Company, Pittsburgh): The Schaeffer Prone Pressure Method is a method for artificial respiration. That is all. It is not to be used except when a person has stopped breathing. When a person has stopped breathing he is dead. Regardless of whether he has abdominal injuries or not, or whether he has broken ribs or not. I have a case on record where a man had three broken ribs. Electric shock had taken place, and he was resuscitated after 23 minutes without breathing. My opinion was that the man would die of chromatic pneumonia, but he didn't, and if the Schaeffer Prone Pressure Method, or some other method of artificial respiration had not been used he was already dead, therefore I would use artificial respiration when a person is not breathing, and under no other circumstances, and I would consider that if I don't make him breath, he is dead anyway.

Another thing, in the control of the tongue—the proper teaching of the Schaeffer Prone Method, or any other method the manual or artificial respiration includes the control of the tongue absolutely. The tongue must be controlled. The whole method of artificial respiration, depends on one thing: suction. And the forward motion in the Schaeffer Prone Pressure Method is the essential motion because you cannot get any air into that man's chest unless you suck it in, and you cannot suck air in unless you compress the diaphragm, especially the ribs, and allow them to contract and suck the air in.

(Mr. Wallace presented his motion picture film "Bringing Safety to the Producing Field.")

FRIDAY MORNING SESSION

Chairman Bonsib: Before we start, I have a report in my hands that we didn't have a chance to read at the previous session. Inasmuch as Mr. Senne isn't here, I will have to read it myself.

"As chairman of the Membership Committee for 1923, I would respectfully submit the following report:

"According to my records, there are now enrolled as active members of the Petroleum Section 49 companies, representing the leading production, pipe line and manufacturing oil industries of the United States. We have made a gain of 10 per cent in membership during the past year and while numerically this seems insignificant, it should be remembered that our solicitations were all by correspondence and therefore the impression as regards the real value of our section could obviously not be properly conveyed.

"We have sent out at various times several hundred circulars and many pamphlets together with sample copies of the National Safety News. These were forwarded to a selected group of petroleum companies, whom we judged by their comparative size and activities would probably be interested in safety work.

"We believe from present indications there is a tendency to more closely observe the Safety Movement and have no doubt that in the approaching year we will be favored by a considerably increased membership. It is indeed reassuring to note the impetus and, more important, the steady decrease of accidents among those who are steadily and consistently practicing the safety code. This in itself, regardless of a rapidly increasing membership, should be an encouragement not alone to the individual companies now in membership but also to prospective members. The casualty records of all concerned we are quite sure show a considerable decline both in the number of accidents as well as severity and we think that this alone should be a sufficient incentive for a greater cooperation which we hope may result.

"I desire at this time to express my thanks to all of those safety men who have so freely given their time and assistance in the accomplishment of the work of this committee as well as the time and advice they have given in service on the manufacturing committee during the year just ended.

Yours very truly,

"E. J. SENNE,

"Chairman Membership Committee."

(It was voted, on motion duly made and seconded, that the report be received and filed.)

REPORT OF NOMINATING COMMITTEE

Chairman Bonsib: We are now ready to hear the report of the Nominating Committee.

The report of the Nominating Committee follows:

For chairman: D. J. Wallace, Humble Oil and Refining Company, Houston, Texas.

For secretary: E. J. Senne, Vacuum Oil Company, New York.

For vice-chairman, pipe line division: E. D. Murphey, Safety Engineer, Cosden & Company, Tulsa, Oklahoma.

For vice-chairman, manufacturing division: E. A. Timm, Standard Oil Company, Bayonne, N. J.

For vice-chairman, producing division: V. R. Currie, Texas Company, Houston, Texas.

For vice-chairman, marketing division: R. S. Bonsib, Standard Oil Company of New Jersey.

(Upon motion duly made and seconded, it was voted that the report be accepted as read.)

(Mr. Bonsib invited the newly elected Chairman, Mr. Wallace, to take the Chair, which he did.)

GETTING SAFETY TO "BELONG"

ELMO D. MURPHEY, SAFETY ENGINEER, COSDEN & COMPANY, TULSA, OKLA.

Recently we heard of a conversation that a staff officer had with an employee about safety work. The workman's expression of appreciation of the work compared to that of previous administrations, led the officer to ask just where there was a difference and why people were so willing to co-operate with this safety man. The workman replied, in a surprised voice, indicating that the reason was very evident:

"Why, it's because he *belongs* around here".

I have thought about that answer many times and have asked myself "Do my methods warrant such a statement from the men in my own field?"

Why do we find organized safety work an industry? Is it not because the owners and executives understand that every industry is two-fold in nature; the material and the human. If the human phase is neglected, their business must suffer in terms of profit. Realizing that it is a paying business policy to give this phase consideration, they plant the safety policy, with confidence of a harvest of increased production, lowered costs, goodwill, stability.

The real mission of the Safety Department is to cultivate and bring about a growth so that it shall bring forth the fruits expected.

Carnegie hired experts, men of high calibre, to teach him what he knew about making steel and to help him build up that great industry. He may not be told in so many words, but a safety man is expected to do the projective, constructive thinking on the subject of safety, and put it in shape to throw on the screen before the owners, executives and others interested in the growth of the safety germ.

The safety man must keep in touch with all new ideas, methods and information. That is why several hundreds of us are gathered here in Buffalo.

In big business there is a growing regard for the value of human life. From this, we are warranted in believing that the industrial world is growing better. Where there is little regard for human life there will be a

lack of respect for government, religion and the higher ideals which make for stability and progress. Compare American industrial and social standards with the industrial and social standards and the cheapness of life in Mexico or Russia. The stability of American industry, where life, liberty and the pursuit of happiness are guaranteed and fostered by the American spirit of democracy, is a direct contrast to the uncertainty in Mexico or Russia, where such standards are lacking or have been perverted.

Safety work appeals to owners and executives because man has an instinctive feeling of revulsion against suffering and human waste. "The voice of thy brother's blood calls to me from the ground," cries Conscience. Every accident means a wasting of the company's money as well as the resources of the men injured. Few men in business want to carry the burden of a realization that they have been remiss in duty toward the spirit of the Golden Rule.

Owners or executives plant safety because they have a pride of ownership or management; they prize up-to-date methods; they do not want to overlook any good thing for their business if it is practical and will produce good results.

For the purpose of discussion we are assuming that the Safety Department head is a line officer responsible to a staff officer, with authority to supervise all safety matters in the organization.

First let us consider the relation of the Safety Department to the Department heads or sub-heads, or as they will hereafter be termed, "The Foremen":

GET ACQUAINTED WITH THE FOREMAN

Get acquainted with the foremen! If we are to get safety work to "belong" to the foremen as much as the habits of eating and drinking, we must learn his viewpoint, his problems, his relation to the rest of the institution; the family and community influences which affect his disposition and attitude. Then we can adapt our plans to suit.

We should take into consideration the essential things expected of every foreman, viz:

1. To improve shop or department morale.
2. To increase production.
3. To decrease costs.

We should shape our methods to help him in obtaining these results.

The foremen should understand the relation of accident prevention to production and costs. He must be shown how accidents run up costs through lost-time, increased labor turn-over and the general effect on department production often noticeable after a workman is injured.

If a foreman should be of foreign birth and rearing, he must be educated in American ideals and industrial methods, particularly in the spirit of safety.

Every foreman should be kept in touch with new developments in the safety realm pertinent to the different departments.

Frequently a feeling of jealousy towards Safety on the part of a foreman has to be overcome because he fears it "may show him up". If his men know he has this attitude they will hesitate to report bad conditions for fear of "getting in bad with the boss." Such a condition calls for careful and patient handling. To eradicate this fear of criticism we should try to make the right appeal to the very thing that is its basis: his pride. Persuade him of the wisdom of eliminating unsafe practices or conditions which may cause criticism. Reach him through the instinct of leadership. Show him that the safety program cannot fully succeed without his co-operation. Demonstrate to him how he may gain from co-operation in increased production and lowering costs. Soon he will court constructive criticism.

The methods used with the foremen must be so formulated that the workmen will not get the idea that the Safety Department dominates their leader, and thus injure the foreman's pride and the morale of his department. Never dictate to him. "Laying down the law" is generally disastrous. Safety, to accomplish its end with the foremen, as well as the men, must become a controlling motive rather than a set of laws and rules.

Men will put forth greater efforts if the competitive spirit is appealed to. Keep his accident record before him, show him what other departments have accomplished. Lead him to try to excel.

Sometimes foremen who appear indifferent, the so-called "hard boiled" foremen, can be appealed to through their emotions. You all know about the Detroit Police Judge who has compelled traffic offenders to view the remains of their victims at the morgue. In some cases, it takes such a measure to wake a man up to his duty to eliminate needless suffering of the injured and the hardships placed on the family. After a serious accident, get the indifferent foreman to accompany you and the injured party to the hospital and afterwards visit the man's family. If he is not a convert before that, he will be afterwards!

THE WORKMAN

We have heard a great deal in Safety gatherings and literature of the need of "securing the backing of the management". My conception of this is that the safety man need not worry about the backing of the management if he makes good with the workmen. They produce the profitable results expected. The management gave it's backing when they planted the safety policy. It is up to the safety man to do the forwarding, if you please.

We must have the confidence of the workmen. This is the largest group with which the safety man deals. It is potent in possibilities. To get their confidence is a prime requisite. Can the safety man make good with the workmen, so they will say of his work that it has made safety "belong", if he has a superior air? His attitude should be such that no distinction is visible.

Men react favorably to a genuine interest in them. It causes them to feel that they are more than a cog in the machine. The safety man

who knows the workmen, who has acquainted himself with the problems they meet in doing their daily stint, as well as the influences surrounding their lives, will have many loyal allies. Maintaining a close touch with the workmen means the battle half won.

Through personal contact with the workmen we may have fruitful source of first-hand information as well as an avenue of dispensing first hand information on safety practices and methods. Boyd Fisher has said, "Safety Instruction has to be specific and *personal*—it has to be talked". Politicians know the value of personal contact in their campaigns. After the campaign is over they may cease to kiss the babies and no longer ask Hiram how his corn crop is coming along. The safety man's campaign is never over. He must always be on the alert to elect the safety ticket. The modern bank cashier's office is not hidden at the back of the banking rooms and behind a door marked "Private", but is out in the main room and easy of access to every customer. The workman is one of the customers of safety. We cannot afford to lose contact with anyone who buys in the safety market.

SAFETY REPRESENTATIVES

If a safety man interests himself in the workmen, they will respond with an interest in safety work. He can cultivate this interest and cause it to have a steady growth by giving the men definite work and responsibilities.

We have found it profitable to have each department in the plant elect from one to three Workmen Safety Representatives. These men report direct to the Safety Department any unsafe practices or conditions anywhere in the plant. Each representative is expected not only to be on the alert for such items, but to keep in touch with his fellow workmen and encourage them to do the same through these representatives. They are elected for six months and cannot succeed themselves. They make written reports which go to the Safety Department head, and he is the only man who knows the source of any item. We have found this confidential feature is sometimes an important consideration in dealing with certain reports.

Through this Safety Representative system we discover the men who are alert and vitally interested in Safety. We cultivate that part of the field very carefully. Our experience with this plan has demonstrated that the best way to corral a man's interest in a thing is to give him a definite responsibility for its success.

Our Plant Safety Committee of mixed membership, foremen and workmen, meets once a month at the company cafeteria during the lunch hour. The members meet in a room shut off from the main dining room and transact the business of the committee between 12:50 and 12:55 o'clock after lunch is eaten. There are five regular members and to each meeting we invite a couple of workmen from one of the mechanical departments and the same number from one of the operating departments.

These are selected from a different department each meeting. Thus, in the course of a year we give a large number of the workmen an insight into the work of the committee

EDUCATIONAL METHODS

One of the most important means which may be used to get safety work to "belong" is through the educational methods.

Accidents are more likely to occur to inexperienced or uninformed men than to older men who are better acquainted with the working conditions. Safety educational work has an important bearing on the end to be achieved. When we deal with men who are illiterate or of foreign birth and training, the need for educational work to overcome these obstacles in the path of accident prevention is even more pressing. These men must become acquainted with American standards, language, and the spirit of the safety idea. Safety instruction given to new men must be driven home by repetition until they really know it.

Sometimes, in order to convert men to certain safety ideals, it is necessary to demonstrate the safe ways in actual practice.

The good to be gained from posting bulletins giving safety ideas should not be underestimated, particularly the frequent use of home-made bulletins. We believe these should be used as often as possible in connection with the excellent bulletins issued by the National Safety Council and others. Illustrations of local conditions and practices on safety catch a man's interest as a photograph of his wife or a personal mention in the society column stirs up sudden and unusual interest in the paper.

We should not overlook the good that may be accomplished in spreading the safety idea by way of the eye-gate; by means of the moving picture, warning signs and the like. The National Safety Council has recognized the importance of this means of propagation, and has been very active in producing and making available some very good safety films.

THE INSTINCTS AND EMOTIONS

Safety makes appeals to the workmen through certain instincts and emotions. Consider the instinct of self preservation, often described as the primary instinct. Most every man clings to and loves his life, has a prompting to protect it at any cost. Some may, at times, seem to think that they haven't much use for "this safety stuff", yet when it comes to a show-down they will not surrender one iota of their right of full protection. Why is it then, if the instinct of self-preservation is so deep-seated, so primary in a man's nature, that a man will take chances, gamble with the cards of fate? Is it not because of the sporting element in his make-up? It isn't because he doesn't know the odds against him when he sits in a game with Carelessness, Thoughtlessness and Inattention. As Dr. Risteen has so aptly expressed it, he has unconsciously allowed room in his mental background for the attitude "That has happened to others but it can never happen to ME". He doesn't say that, no, he doesn't even *think* it, but because he has allowed

it to creep into his attitude he rushes across the track in front of a speeding train, or takes a chance in his work because "By golly, I've done it that way for years and have never been hurt yet"!

It is the problem of the Safety man to turn the sporting element into another and profitable channel. Appeal to the competitive spirit in sportsmanship. Every runner in the race of life should run with a prize in mind. If we run not for a prize, our efforts are wasted. Show men the foolishness of assuming that anyone is given a special immunity against accidents and set them out on a run for a "No Accident" record. Persuade them to stop gambling with fate and invest in safety which pays sure profits.

Safety makes appeals by way of department or gang spirit. We have all noted the influence of the crowd, upon men's actions. We often imitate the customs, fashions and habits of our associates. If the gang spirit is such that it encourages the spirit of bravado or recklessness, the safety man who maintains close contact with and knows the men, will soon recognize the situation. He will institute suggestive, educational or disciplinary methods to remove this spirit; the weed found growing among the wheat in the field of Safety. Disciplinary measures should be used as a last resort.

This brings us to consider the instinct of subordination. Few men expand under compulsion, but most of us, in the stress of life's struggles turn instinctively to follow a leader who commands respect. Men ordinarily do not like to be "ordered around." Soldiers swear by the captain who is strong on discipline if he is at the same time just in his dealings. Leaders of men in industry should be just and impartial before they are generous. Men thresh around under an inefficient, though it may be an indulgent leadership. Those placed in positions of responsibility and leadership may be so indulgent, so thoroughly a "good fellow" that their command of respect becomes practically nil.

There must be certain rules and regulations established to govern everyone. These should be stated so they will be easily understood.

DISCIPLINE

In dealing with men in our company we have had few cases where it has been necessary to use disciplinary measures. We have found that a reprimand is generally sufficient to correct cases of infraction of Safety rules. If a boilermaker is found to be violating our goggle rules his record is charged with a reprimand from the safety man. If he is guilty of a second offense he is taken before the employment manager in a Kangaroo Court. The employment manager generally asks the safety man, department foreman, and sometimes the first aid supt. to sit with him. They hear the evidence, review his record and pass upon the form of discipline. Usually if the man is temporarily demoted to the general labor gang from three to ten days at the rate paid to laborers, the discipline results in lasting good, and reacts favorably through the department and the plant. Rarely has it been necessary for us to discharge men for infraction of the safety regulations.

Disciplinary measures must be handled without malice but with good will to all. If based on that spirit and with the ultimate good and protection of the men in view, and not predicated upon the spirit of authority and power alone, they may be employed as a helpful means of getting Safety to "belong".

By including the methods we have discussed, we may be instrumental in bringing about the maximum of Safety when all men shall acknowledge its reign in their hearts and lives, when disciplinary measures are no longer required, when all shall have entered into a full appreciation of the fruits of careful habits, when Safety really "belongs around here" and is the first consideration in every action.

STATIC HAZARDS IN GASOLINE HANDLING

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"Static" or "static electricity" as used in this article refers to the electric charges such as those generated or induced by the contact and separation of various materials, which charges may discharge by means of a spark. These are the charges generally spoken of as "frictional electricity."

"Gasoline" is used as a general term, to include not only motor fuel, but the whole class of light petroleum products above kerosene whose volatility makes their storage, handling and transportation hazardous.

"Frictional electricity," so called, has been a phenomenon of common knowledge for centuries. It was observed in ancient times that certain kinds of materials when rubbed acquired the power to attract light bodies. Since the experiments of Franklin and others of his period much more has been learned of the nature and manifestations of this electricity, so that no comment is now excited by sparks from walking across a carpet, stroking a cat's back, combing the hair with a rubber comb, etc. Likewise, every high school boy is today familiar with the Holtz influence machine. In all of these cases the building up of a charge has been the accompaniment of friction, and therefore believed to be due to friction between certain materials.

Modern research and experience, however, have found instances of the production of static charges under circumstances where no friction was involved, requiring explanation on some other basis. Study of the subject has resulted in the advancing of the theory that static charges are the result of intimate contact between different materials, with or without friction. For some ten years or more this theory has been applied, and has explained both old and new phenomena. Insofar as the "frictional electricity" is concerned, it is readily evident that on this basis the friction has been merely the means of securing intimate contact, which has been immediately followed by separation, causing such an increase in potential as made the charge readily evident: this phase will be referred to later. As an example of the formation of static charges

without friction, we have the well-known sparking from belts on machinery. This was formerly classed as an example of frictional electricity; but it is found that the charge is still produced when the loose pulley is the only mechanical load on the belt, and there is no likelihood of any slipping. Moreover, increasing the load to the slipping point does not materially affect the formation of charge. Refer to the extremely clear and non-technical article on this subject by Prof. Elihu Thomson, from which the following is quoted: "If we take a turpentine varnish as a film and dry it upon metal or glass, and use enough varnish so that it becomes of such thickness as to be stripped off when nearly dry, it will be found that such a film comes away from the metal or glass in a high state of charge, so that it will stick to any surface nearby by electrostatic attraction. The same is true when a collodion film is dried against a glass surface and stripped off. Here, the pyroxiline comes away in a high state of charge. Such actions do not involve friction."¹ The entire phenomenon, then, can be explained by the basic principle discovered 150 years ago by Volta, "contact between heterogenous materials is attended by separation of the electricities."

If the materials in contact are separated, and are conductors, the charges will flow to the points last in contact and there neutralize each other. If one of them is a non-conductor, it will carry most of its charge with it, since the charge cannot be conducted through the insulating body. By induction, the opposite charge will also be retained on the conducting material. There has thus been created a condenser, having the two materials as plates and air as a dielectric. In this condenser, as in all condensers, a separation of the plates is attended by an increase in voltage. This is shown as follows:

CAPACITY AND VOLTAGE OF CONDENSER

The capacity of a condenser in terms of its materials and dimensions is given by the equation:

$$C = K \frac{A}{X} \quad (1)$$

Where C = the capacity in farads

A = the area of the plates in sq. cm.

X = the thickness of the dielectric between them in cm.

K = 885×10^{-16} x the inductivity of the dielectric

Further, the charge which is considered as representing the exchange of electricities that has taken place, is given by—

$$Q = CE \quad (2)$$

¹ The Nature of Tribo-electricity, Journal of the American Institute of Electrical Engineers, May, 1922, page 342. Unfortunately this article was not included in the transactions A. I. E. E. Dr. Thomson's paper is quoted further in National Safety Council Safe Practices pamphlet No. 52 on Static Electricity

Where Q = the charge in coulombs

C = the capacity of the condenser in farads

E = the potential difference in volts

$$\text{whence } E = \frac{Q}{C}$$

$$= \frac{Q}{\frac{A}{KX}} \quad (\text{substituting from (1)}) \quad (3)$$

$$= \frac{QX}{KA} \quad (4)$$

From equation (1), the capacity of the condenser formed by the two materials being separated and having air as a dielectric, is reduced as their distance apart increases. Further, since the amount of charge is now fixed (until discharge occurs), the potential difference will increase in inverse proportion to the capacity (equation 3), or in direct proportion to the distance apart (equation 4). This law of the increase of voltage is subject to certain maximum limits for any particular case, which need not be discussed here. It is sufficient to know that this voltage is quite high enough to produce sparks that will ignite an inflammable vapor. The increase in electrostatic energy through the rise in voltage represents the work done in separating the charges against the force of their electrostatic attraction.

The readiness with which the vapors of these light products can be ignited is well known. That it could be done by a fine static spark was the experience in accidents which happened at least thirty years ago. The static spark, although very small and representing an extremely small amount of energy, is nevertheless a spark of very high temperature.

"An accident of this description occurred on December 14, 1893, at Bradford (England) in a process for waterproofing cloth by treatment with paraffin wax dissolved in petroleum spirit. On this occasion the question of the prevention of such accidents in the future received a good deal of attention."²

Another accident of early record called the "hair dresser's accident" happened in 1897. "A woman was being shampooed with a wash containing gasoline, when sufficient 'frictional electricity' was generated to produce a spark which ignited the vapor, burning her so severely that she died."

"A naval surgeon wearing a fur coat and rubber boots (which insulated him from the ground) made a spark, presumably by friction on the fur, sufficient to ignite the gasoline in the tank of an automobile."³

2 "Handbook on Petroleum," by Thomson & Redwood.

3 "Gasoline and its Danger," by Augustus H. Hill, Power, vol. 48, No. 3, July 16, 1918.

STATIC DISCHARGE IN HEAVY OIL TANK

One of the simplest examples of the above principles known to the writers is a case of very heavy static discharges in tanks of filtered cylinder stock, 110-140 viscosity. This material is filled into steel tanks 20 feet high by 15 feet diameter, at a temperature of about 140°F. by running from the open end of a 2 inch grounded iron pipe into a steel basket strainer, 18 inches high by 24 inches diameter, having a 100 mesh brass gauze in the bottom. The basket is supported on top of the tank by iron supports attached to the tank. The oil falls in streams 20 feet or less. On dry days a charge of enormous voltage accumulates on the surface of this oil, discharging from time to time to the tank or to a vertical pipe in the center. The writers have seen discharges as long as four feet in a jagged line across these tanks, accompanied by sharp reports.

On account of the comparatively heavy grade of this oil no trouble has resulted from these discharges. However, it was thought best to eliminate them. For this purpose a brass chain was suspended from the grounded frame of the strainer, so as to hang about centrally under it.

The effect of this was to provide another point to which the arcs could discharge, somewhat reducing their length, but not materially decreasing the amount. Two types of baffles were then installed to deflect the oil stream against the side of the tank. Both failed to eliminate the sparking because the oil again fell away from the tank, and so again built up a potential. The desired result was accomplished by attaching a galvanized sheet iron funnel under the strainer, bringing the oil into a galvanized spout, which conducts it to within a few inches of the bottom of the tank. This is below the normal oil level. With this arrangement most of the oil was kept in contact with grounded metal, and the rest in extremely close proximity to it. While some slight discharges might be expected within this spout, none has been observed, and sparking outside the spout has been entirely eliminated.

This phenomenon verifies the theory of static generation by contact and separation rather than by friction. Each molecule or each drop of oil coming into insufficiently intimate contact with the strainer takes part in a "Separation of the electricities" and immediately falls away from this contact, carrying a minute charge. The infinitesimal distance which separated the oil and the strainer is then multiplied practically by infinity in the twenty-foot fall to the oil surface resulting in the increase of voltage noted above. This is estimated in the case of the four-foot spark at several hundred thousand volts.

The case of this tank calls to our attention the fact that a serious static charge can exist even with all metal parts and containers grounded, and that in pouring or loading inflammable liquids in bulk, it is not necessarily enough to ground pipes, hoses, tanks, etc. At least two fires are known to have occurred from pumping hot oils through grounded pipes into grounded tanks. Complete safety may require a conducting

pipe practically to the bottom of the receiving tank or vessel. This must be determined for any particular case with respect to the material being handled.

PREVENTING TROUBLE AT THE FILLING STATION

A more familiar example of the same action is the case of the filling hose at a gasoline service station. Here the brief contact with the brass filling nozzle is sufficient to start a charge. Were the nozzle ungrounded, it would itself accumulate sufficient charge (of opposite polarity to that of the gasoline) to cause a dangerous spark when brought near any grounded object, as a metal gasoline can. For this reason it is common practice to connect the nozzle to the grounded measuring pump by means of the metal lining of the gasoline hose, and of a copper wire imbedded in the hose and soldered to both ends. But the danger is not ended then, for the same hose is used for filling the tanks of automobiles which are insulated from the ground by their tires. The charge carried over by the gasoline accumulates on the automobile as long as the gasoline is flowing, and will jump to ground through the filling nozzle if it is held a short distance away. To prevent this, the body of the automobile is grounded by placing the nozzle in contact with the gasoline tank before starting the flow, and holding it there until the flow has ceased.

The loading and unloading of gasoline tank trucks properly receives especially careful attention. Here again an insulated vehicle and a grounded filling line or receiving tank are involved. The preventive is again the grounding of both. In the case of loading, a chain or wire may be used, properly attached to the filling line and connected to the tank or body of the truck. For unloading, it might be sufficient to make contact with the receiving tank by means of the nozzle of the delivery hose if this contact were sure of being maintained. But as the hose is not likely to remain stationery during the entire delivery, due to such causes as the rising of the truck body as its load is lightened, and others, there is considerable danger of such movement of the nozzle as will break its contact at least momentarily, and cause the fatal spark. It is therefore recommended and is the general practice of some companies to establish a definite metallic ground by means of a chain or otherwise for unloading as well as for loading gasoline. It is the recommendation of the authors that all such grounding connections be made of bare, stranded copper wire, about No. 10 B. & S. gauge, and that the connection to the tank be made at some point away from the manhole and before opening it. It is suggested as preferable that the grounding wire be permanently attached to the truck, rather than to the loading line; this will enable the wire to be used for unloading purposes also at the customer's premises.

STEAM JET CAUSES STATIC CHARGE

A source of electric charges perhaps less familiar but just as sure, is the steam jet. Mr. Harmon F. Fisher, of the American Petroleum Insti-

tutes,⁴ relates that a steam automobile exhausting against a barb wire fence charged the wire to such a voltage that sparks were drawn from it. At the same time the automobile also was charged and gave shocks to those touching it.

Prof. Thomson refers in the above mentioned article to "the old Armstrong hydroelectric machine, whereby steam, issuing from a boiler, produces a cloud in a high state of electrification, resembling a thunder cloud on a small scale." He suggests that it "is probably dependent upon modification of surfaces and surface tension."

An instance which was brought under the attention of the writers was the following: An empty gasoline truck which came in for magneto repairs and was allowed to stand during lunch hour was found heavily charged by the workmen on their return. No other truck in the vicinity was charged, and this truck did not become charged in any other location. A run on the asphalt paving failed to reproduce the charge. A little investigation revealed a small leak at a fitting on a nearby steam pipe, the wind being in such a direction as to carry the vapor across the body of the truck. It should be noted that the white cloud of steam had died out almost entirely before reaching the truck. Several rearrangements of truck and trailer and other trucks verified the conclusion that the steam leak was the direct cause of the charge. The accompanying

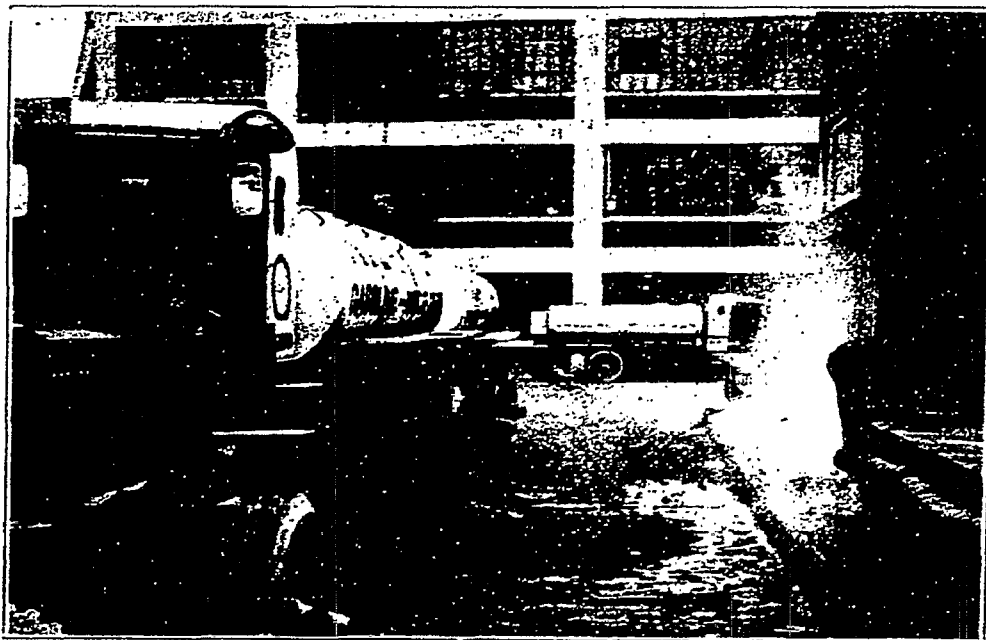


FIG. 1.

4 A Few Notes on Hazards from Static Electricity. See also Safe Practices pamphlet No. 52 (National Safety Council), paragraph 16.

photograph (Fig. 1) shows the incident and its circumstances. In experimenting to reproduce these conditions it was found that steam at 75 pounds per square inch gauge pressure escaping through a $\frac{1}{8}$ inch round hole, charged a truck sufficiently to give a $\frac{3}{4}$ inch spark in five seconds.

This case strengthens the argument for grounding tank trucks before beginning loading or unloading, and before opening the manholes, as there may be an initial discharge at the instant of making the connection, with danger of igniting vapors present. Oil companies have little control over their customers' steam leaks, and may even have some leaks of their own.

The use of the steam hose for steaming out tank cars and trucks presents exactly the same electrical conditions as above, with the added condition of having a nearly closed vessel filled with an explosive mixture. Explosions from this cause have been known. Steam hose used for this purpose should be provided with a ground wire connected to the nozzles at each end, as in the case of the gasoline hose. This wire should be a stranded wire of about No. 16 B. & S. gauge. Fig. 2 shows

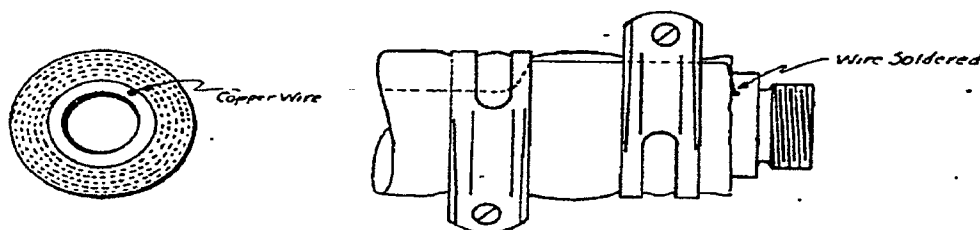


Fig. 2. Grounded Steam Hose.

one form of grounded steam hose. The hose should not be allowed to sway so as to cause sparks by violently striking the steel tank. If used on a truck insulated from the ground, the truck should be grounded.

An application of this principle, which is quite interesting, although not directly on the subject, was made by an electrical engineer of a manufacturing company, who built an apparatus for detecting the approach of storms. He erected an antenna connected to a device for ringing a bell when excited by static or other high voltage. The theory was that the antenna would collect the charges, from the particles of moisture in the moisture-laden condition of the air preceding a storm, thus actuating the bell-ringing device. The apparatus worked excellently, except that sometimes it functioned without apparent reason in the midst of a sunny day. One morning the recording attachment showed that it had been ringing at intervals all night, on the calmest of starlight nights. An investigation developed the fact that the device had been actuated by charges collected from the steam and smoke exhausted by a shifting locomotive on a nearby railroad track, and that the mysterious signals received during the day were caused by the plant locomotive when working in that part of the yard.

LOW DIELECTRIC STRENGTH OF MIXED VAPOR

An interesting and important fact in the relation of static hazards to gasoline handling is the fact that over the explosive range of mixtures of naphtha vapors and air, the dielectric strength of the mixture is less than that of either naphtha vapor or air. Experiments conducted by the authors show that the voltage required for the puncture of a 5% mixture is 10% less than for air under the same conditions. For a 10% mixture 16% less voltage is required. As the naphtha vapor alone has a considerably greater dielectric strength than air, it is evident that discharge will occur more readily in a mixture than in either air or naphtha. Or, when the discharge occurs, it will choose the path of the mixture in preference to an equally long one in either air or naphtha.

Another important fact is that the vapor of gasoline is about three times as heavy as air. It will, therefore, flow to low levels. One instance is reported of a fire resulting from the flow of vapors downward to a boiler plant two or three hundred feet away.

One might be inclined to assume that a dry atmosphere is essential to the production of an electrical charge. This is not correct. In moist or dry atmosphere the electricity is generated just the same, with the difference, however, that when the atmosphere is damp the charges usually are led off as fast as formed. Dry air permits the charges to accumulate in a charged body until contact with some other body or until of sufficient potential strength to jump to some less highly electrified object.

Static electricity is only one of several peculiar happenings in nature which are very common to us but which have been more or less mysterious. Its presence in oil handling has not, in many cases, been properly understood and fires have been attributed to other causes that should have been laid to static. While most of those fires directly traced to its influence have occurred in the lighter oils, its presence in the handling of heavier oils is clearly established. The first step in precaution, therefore, must be the increasing recognition of static as a hazard not only as pertaining to light oils but in the handling of all oils because of the indefinite line of danger of fire in any grade. In conclusion, we point the obvious; Static is a natural phenomenon that can not be prevented. It can, however, be controlled. Properly grounded it can be led harmlessly away.

DISCUSSION

Chairman Wallace: I had the privilege of discussing static, by letter, with Charles P. Steinmetz (now dead) who is an authority, if there ever was one, on static electricity, and there is a very great question in his mind, whether we can have a static discharge in an explosive mixture and not have an explosion.

Mr. Ramsey: It is pretty hard to make a quantitative measurement of a static discharge. A real static discharge, where we have a spark which jumps from one point to another point, I believe would cause an explosion if an explosive mixture were present under almost any condition.

Mr. Epps (Tidewater Oil Co.): It has seemed to me that the knocking to and fro that a drag chain gets will certainly establish a sufficiently good metallic contact between the links, so that we will have as good a contact between the links as we can possibly have between the links and the ground, especially dry ground. Therefore, I should say the chain would be practically as good as a wire, because, after all, I believe it is the ground itself that is eliminating the condition rather than the metallic contact between the links of the chain.

Mr. Epps: I would like to ask Mr. Ramsey about the best methods of relieving belt static. Has he gone into the method of the use of combs for removing the static electricity from belts, or is just simply grounding the shafting, both the drive and the other end, sufficient? Is the comb necessary?

Mr. Ramsey: Peculiar differences occur in different cases. The comb is very often necessary. I have in mind, though, one drive in our plant where we have three compressors driven by individual motors of one hundred horse power. They are all side by side, no difference whatever, so far as we can see, in the operation; but two of them are perfectly free from static and the third is very bad. On that we have found it necessary to use a comb. The comb should be applied to the belt, if possible, dragging or trailing very flexible wires or something of that sort, and applied at the point where the static is most evident, where it wants to get off of the belt. It is sometimes necessary to do that, and very frequently a grounding of a shaft will not accomplish it at all. The belt material is a poor conductor.

Editor's Note: For further information on humidity and its effect on static, see Safe Practices pamphlet No. 52, paragraphs 44-50, and No. 37, Fig. 4.

ACCIDENT STATISTICS

Mr. Sandel (National Safety Council): I presume that every member of the Petroleum Section has been interested in the accident statistics for the first six months of the year 1923 which are published on page 46 of the October issue of the *National Safety News*. All companies which participated in this tabulation, save one, are published here. The reason that the one record is not published is that it was received in our office on the day that the presses started to turn out the magazine, and of course we couldn't get it in. That company is No. 16, and with a severity rate of 1.180, they would have stood ninth in the tabulation as published. This would make a total of 14 companies which participated in this tabulation, running for the first six months of 1923.

Last year at this time there were only six to eight companies which were represented in the tabulation for the first six months. That number came up to 21 for the entire year of 1922 which was published some time ago. In this year's tabulation, there are two new-comers, companies 22 and 23, which have come in, and you may be sure that we are glad to receive other members who have not yet participated.

The plant having an accident which results in the loss of an eye is penalized for 1800 days. I believe that that figure was the result of an average of experience on losses of that nature, taken from a large amount of information. When the loss of an eye is reported, the actual time lost is not used in the statistical work, but the 1800 days penalty is used instead. For instance, suppose a man lost an eye and he actually lost, say, 100 days from the plant. That hundred days is not counted in the total amount of time lost, but 1800 days is counted instead. The figures for the different major injuries of that kind do enable us to put the plants on a comparative basis.

SAFETY VALVES AND PRESSURE GAUGES ROUND TABLE DISCUSSION

Mr. Epps: I had in mind trying to get some information on what would be the most satisfactory way of gauging casing-head tanks. At our plants, we are using simply the gauge glasses. On account of the vapor pressure and the casinghead gasoline, it is, of course, impossible to gauge by the ordinary methods, and I would like very much to have an expression from the men here who are in that work of what they are doing, what practice they are following in gauging casinghead tanks. I think the ordinary gauge glass which we are using is a decided hazard. They break frequently, their material is spilled. Sometimes the safety arrangement in the valves won't operate, sometimes they get clogged. Sometimes I find that the tanks aren't equipped with safety gauge glass valves.

I think the matter of relief valves for stills is one which deserves our most earnest consideration. An analysis of our own fire record for this year shows us that we have a total of 43 fires, and those fires are of the kind that have been extinguished simply with a bucket of water up to the kind that have required the operation of all our plant equipment. Of the 43 fires, 27 of them occurred around stills.

Going back over our fire record for the last three or four years, I find at least an average of 50 per cent of fires around our refinery occur at stills. A great many of those have occurred from the operation of relief valves and the discharging of the oil into the air, and the resultant ignition of them.

Mr. Esterley: How will that work when the oil fires?

Mr. Epps: The oil won't touch the air at all until it gets into this tank.

Mr. Esterley: The valve is entirely enclosed?

Mr. Epps: Atmospheric stills,—yes, sir.

Mr. Esterley: Do you conduct that pipe through a condenser?

Mr. Epps: No, sir; the most direct path possible. They don't want to condense it at all.

Mr. Bonsib: What means of inspection do you have?

Mr. Epps: We have the still inspector go up and take this arrangement and rotate it once every run to see that it is seating properly and is free. We have a manhole arrangement in this box which can be taken off very

quickly by means of a few thumb-screws, so that once every several runs (I don't know whether it is four or five or a dozen) he looks in there and makes an examination.

We don't plan to run any considerable length of line here, and we plan to make this line several inches larger in size than the size of our relief valve connections. I don't believe that the amount of back-pressure we build up there would be very great. We are planning to use about 16 inch pipe.

FIRE FIGHTING

Mr. Timm: Before we go on to the next discussion, I would like to know if there are any gentlemen here who can give me any information on fire fighting.

Mr. Epps: We cover pretty nearly a square mile, and it is divided into four zones, four or five zones. In each zone we have a battalion in charge.

First, there is the consulting chief who is the superintendent of the plant, who is to be consulted on all matters involving expenditure and involving policy in the fire department. Then we have the fire chief himself who is one of the foremen in the plant. We have the assistant fire chief who is also a plant foreman.

Then we come here into several departments. First, we have what we call the fire fighting division, and here we have a number of battalions, one for each yard. Each battalion is divided up into companies, eight men in each company. Each company is assigned to a certain definite piece of apparatus.

Over here we have a salvaging division, which consists of an organization of the men in the pump houses and the superintendents of the different divisions for storage and transportation of oil around the plant. In other words, they organize to shift oil really, including our railroad facilities around the plant, moving material.

Then we have still a third division which we call our auxiliary squad. That covers the commissary, the repair work, machinists and electricians.

There are several other divisions. I can't just recall them offhand. I would be very glad to let you see a complete line-up if you want to have it.

Mr. Aspinwall: In our plants of the Texas Company, we have a fire organization in which practically every man has a duty to perform and responds at the fire signal. The plant is divided off into zones. We also have a fire car in which tools of all descriptions are kept and are only used for fighting fires, so that in case of a fire out in the field, this car is taken there, and every possible tool that we would need would be in that car and it would save our having to go back. We found that a great advantage to us.

LESSONS FROM MINOR INJURIES

Mr. Timm: I would just like to say, in connection with that, that most of the minor injuries in warehouses I have found to be due to the fact that there is a lack of team-work between the men. One man doesn't consider the other fellow, especially in the handling of barrels.

Mr. Bonsib: Nails are probably one of the commonest causes of accidents in warehouses, in warehouses handling case goods and even in warehouses handling barrel goods. Another very common cause of minor injuries in warehouses is hoops of barrels. Men should be instructed against breaking barrels with the unprotected hand.

So many times you look upon a warehouse as not being dangerous at all and don't spend much time with it. I think it is a place well worth spending time on and studying those minor injuries, because so often they are not reported and they develop into bad infections.

Men should be taught how to pin papers correctly. I would like to see pins eliminated, but nobody has invented a clip yet that really eliminates the use of a pin.

Mr. Senne: It seems to me the main difficulty has been the fact that the warehousemen were never furnished with any forms for reporting the accident. They sometimes hesitate, and perhaps some of them don't know how to frame up a satisfactory report of an accident. In other words, if they have no form, they will delay reporting, whereas if they have a simple form and it is right there, the questions are all ready, so they simply have to say "yes" or "no" and describe how the accident happened. It simplifies the procedure, and I think if there was a form provided for the warehouse to report accidents or unsafe conditions, you would facilitate your system.

Mr. Timm: I want to say, in connection with that, that we insist, regardless of the nature of the injury, that the man report to the first aid for treatment. When he gets to the first aid for treatment, they make out an A. B. C.—I form, a copy of which is sent to the safety department, and in that way, the safety department keeps tab on all these minor injuries. That form is entered into a register sheet in the safety department, and then the form is sent to the head of the department. In that way we keep tab on our minor accidents.

Mr. Seals: If we have a minor injury, a scratch or a nail thrust or something like that, we wash it with bichloride. The foreman sends the man right to the first aid during the day-time hours, but in shift work, that is, in the refinery shift work, we have first aid in each large department. Every minor injury must be taken care of, either by the first aid or by the hospital. The two very worst compensation cases we have had have been the result of minor injuries.

Mr. Aspinwall: In the minor accidents that we have, we insist on the foreman being called in to the first aid room, not at the time of the minor accident but some time during the day, and he makes an investigation and then talks the accident over with the supervisor or first aid nurse. It is put up as a lesson, and he goes back and tries to eliminate further danger of an injury of that nature. We find that we have eliminated a lot of small accidents through that method.

THE VALUE OF IMMEDIATE INVESTIGATION OF ACCIDENTS

Mr. McDevitt: I have found that if an accident is allowed to go uninvestigated for a fair amount of time, so much so that the man has had a chance to think things over and also to think of what the penalty may be, that his story is often colored, so much so that the real cause of an accident is not brought out.

I have found it very valuable in my end of the work, which, by the way, is concerned more with the human element than the mechanical, to keep in very close touch with the first aid department. Whenever an accident is at all serious or might have led to serious results, except for the element of chance, either the first aid man or the doctor, if I am in the building will immediately notify me. By catching a man in the first aid room with his injured finger, for instance, in front of him, without the mind having had time to dwell so much on the cause of the injury as the pain he is suffering, in nine hundred and ninety-nine chances out of a thousand, you will get the truth. I have found that very valuable.

Mr. Senne: I have here a resolution which I have prepared.

"The movement towards a definite safety program, and the adoption of universal safe practices, also the devising of ways and means of safeguarding the lives of workers and profit of the companies comprising the petroleum industry, having received due and careful consideration by the respective officers and executives, superintendents, plant men and field workers of the various organizations here represented, as well as the others not present, it is appropriate at this time for us to acknowledge the helpful support and cooperation of all in the requirements and maintenance of safe practices and working conditions.

"Admittedly, without this assistance and encouragement by the management and executives, officials and others, the work and endeavors of the Safety Committee could not be effectively carried on.

"Therefore, be it resolved, that

"WHEREAS, we have received innumerable proofs of the acceptance of the principles involved and of their active interest; and

"WHEREAS, the great support so given has been of considerable help and a real incentive toward greater efficiency, we desire to express herewith appreciation, and respectfully solicit their further aid in further activities.

"In recognition of the services rendered, be it

"RESOLVED, that the Petroleum Section of the National Safety Council express a vote of thanks to all concerned, and that the Secretary write enclosing a copy of this resolution to all whose names are on record as having supported and advanced the general interests of safety throughout the petroleum industry."

(A motion to adopt the resolution was carried.)

ADJOURNMENT.

Plant Publications Section

October 4 and 5, 1923

ERNEST AUGUSTUS, Chairman

Editor, *Mead Cooperation*, The Mead Pulp and Paper Company,
Chillicothe, Ohio

MISS EDNA E. COYLE, Vice-Chairman

Editor, *The Staley Journal*, A. E. Staley Manufacturing Company,
Decatur, Ill.

THURSDAY AFTERNOON SESSION

CHAIRMAN AUGUSTUS: The first thing on the program is the report of the chairman. I haven't any report to make other than that the program will speak for itself.

The next is the appointment of the nominating committee. I will name Mr. E. T. Wilkins, Mr. Spencer Hord, and Mr. A. G. Strickrott as a nominating committee to choose candidates for chairman, vice-chairman and secretary during the coming year. They will report at the luncheon tomorrow.

I will also appoint Mr. Bueno, Earl Neubig, and F. M. Webster as the by-laws committee. They can draw up a set of by-laws for the section and report at the luncheon tomorrow.

THE REAL FUNCTIONS OF A PLANT PUBLICATION

ARTHUR H. YOUNG, MANAGER, INDUSTRIAL RELATIONS DEPARTMENT, INTERNATIONAL HARVESTER COMPANY, CHICAGO, ILL.

I know many people look upon plant publications as frills; they look upon them as one of the "ologies" or "isms," frills that have been showered on us, probably as a result of the Great War. But there is a perfectly logical development which is responsible for their genesis and advent. In the olden days we had a personal contact in industry. Now, with the advent of large units and with the change of ownership from individuals and partnerships to corporations, the old-time contact between men and management has disappeared to a large extent.

We have several forms of substitutes, works councils being one of them, bulletin boards another, and also plant publications.

The plant publication, as a contact point between men and management perfectly justifies itself, and its genesis is wholly logical, due to these

changed conditions in industry. My definition, in a single sentence, of the real function of a plant magazine is that "it is a contact medium between men and management."

A contact medium between those two factors in the equation, to be wholly acceptable must be mutually acceptable. By that I mean that if there is any attempt to make such a contact medium a pure propaganda sheet for management, if its main purpose is construed to sell the company to its men and not sell the men to the company and not to act in an educative manner true to its function as a contact medium, there should be no more hesitation in its discontinuance than there would be on the part of the management if such a sheet were suggested to be published as purely the propaganda sheet of the workmen.

In order to be mutually acceptable, there must be mutual participation in its preparation. I would criticize and think it almost impossible to produce a publication acceptable to my definition if the real functions of a plant magazine which was not staffed by representatives of the rank and file. I don't mean by that any elected representative who is simply a brawny workman without any technical ability, but I do mean representatives on the staff who have had experience as rank and file workmen, who know their viewpoint thoroughly, and not merely from the study of sociological and psychological treatises and purely academic research.

Going for just a moment from the discussion of the academic question to a concrete example: A few years ago, we in the Harvester Company were convinced that the expense of some \$40,000 a year which would be incurred in the publication of magazines in some 17 of our larger plants was warranted. An appropriation was granted by the officers of the company.

SELECTING THE EDITOR

Our first step, of course, was to secure an editor-in-chief, and we had more than 70 applications. All of them were investigated. Our choice was finally based on technical fitness, experience and a demonstrated capacity as an editor. But over and above that, we chose the editor-in-chief of those magazines because of his personality. He was just the sort of a fellow who could work with local plant editors who were of the workmen type and who could be self-effacing and yet one who would exercise a certain control and educative influence; one who could let the other fellow think he was doing it all, that the success of his magazine was greater than any other plant magazine. It was this latter element that kept spurring them on.

Our next step then was to select an editor at each plant. That again was done through the works council. The editor chosen was a local plant man in every case. In one or two cases later we had to bring in some outside assistance, and in both of those cases, the man that we wanted ultimately for the position was not at first hired as the editor of the magazine, but served an apprenticeship out in the shop in a relatively minor capacity before being transferred to his editorial position.

Then we came to the selection of titles for the magazines. We had agreed in our works council deliberations that the magazines should be standard in form and size, thus making possible an interchange of material. Prize contests were conducted at each plant, the winner being chosen by a committee of the works council, and cash prizes of five to twenty-five dollars awarded.

This introduction of our plant publication secured for us not only the cooperation of everybody in the plant, all the forces in the plant, but their active participation, their commitment to its success from the start. They were jointly interested in it.

We published some 17 publications for a period of two and a half years. We suspended publication about a year ago as part of our retrenchment program. It was absolutely necessary to save every dollar that we could. Our only customer is the farmer and we all know of his troubles. When the retrenchment word went forth, we went before the works council and suggested that this \$40,000 a year item was one we might well do without, and, in the present condition of our business, we asked their consent to a temporary suspension of publication, and unanimously that was agreed.

APPRECIATION OF EMPLOYEES

I do not recall ever having had a report, in answer to repeated inquiries made on the subject, of a magazine that was thrown away, of any indication of lack of appreciation on the part of the employees.

On the first distribution of the monthly magazine that was made we checked up very carefully. Reports not only from the staff but from other sources which might not be as well disposed toward a favorable report, indicated that not in one single instance was a magazine thrown away or the street littered up with discarded copies, as is so frequently the case when company propaganda sheets are distributed. There was, from the start, a well sustained interest which was manifested by requests for additional copies and requests from employees who had left our service to be continued on the mailing list.

Frequently, our editor-in-chief would receive letters with money order or postage stamps enclosed so that the little plant magazine might be sent on to a former employee at no expense to the company.

I think the editor-in-chief's success with our magazines was due not only to his personality and the way in which he engineered things so that they would always appear as a joint effort of the company and the employees, but also to the fact that his material, the material submitted by his local editors, after being edited by him was readily readable. I mean by that it was not high brow stuff. Certainly the people in all ranks of life are interested in articles that touch on various refinements of civilization. I don't think that in order to talk shop talk we have to be ultra-slangy. I think too often that mistake is made.

DON'T OVERDO THE SLANG

Recently, I was interested in checking up and meeting a man whose articles I had read. They were all so slangy and contained so many swear words that I came to the conclusion that that chap was a fellow

who would be the antithesis of what his writings indicated. The thing was so overdone that it looked like a man trying to 'borrow strength to bolster himself up. When I met this fellow personally, my opinion was exactly confirmed.

I just mention that to illustrate my point; that in order to talk shop language, don't overdo the thing on the assumption that all shopmen are slangy or vulgar. Articles on the highest of topics in the most refined language can be presented and yet be readable. They are not all going to be interested in the Atlantic Monthly type of article, they are not all going to be interested in more popular magazine stuff, but there is a borderline which calls for just as high literary effort and just as fine a technique on the part of an editor as would be demonstrated in producing an Atlantic Monthly or National Geographic composition. In conclusion, I simply want to submit that, after all, the thing is summed up in just these words:—that the real function of a plant publication is that of a contact medium between men and management. Its real function can best be served and can only properly be served when it is edited and so produced as to constitute a joint effort of men and management, and when its material does not vary greatly from the true vertical on propaganda either company-wise or extra-company-wise, an even balance between the two, a frank admission in some of its articles when company negligence has been shown, or a frank criticism of practices on the part of employees that are felt to be out of step. I believe there is no more important duty of the editor of a plant publication than to keep that pendulum as near the absolute vertical as he can, so that his magazine will not become an organ for any one player.

DISCUSSION

Mr. Robinson (Kimberley-Clark): I would like to ask Mr. Young what he does in case any of the reporters from the plant leave or go stale on the job.

Mr. Young: The plant magazine functions under the control of a committee of each works council, the function of which you are all more or less familiar. Our works council is a fifty-fifty council of elected representatives of the workmen and appointed representatives of the management, and on any constituent committee of the council, management and employees are represented on a fifty-fifty basis.

The plant publications committee, or the publicity committee, which also publishes the minutes of the council usually has been the committee having control of the plant publication.

The editor-in-chief was responsible for the technical ability of the editors. Any criticisms that he had to make were presented to this committee, presented in a wholly impersonal way, that is, simply pointing out the defects. The committee in every case was anxious, and helped to correct the situation.

If we could find any one in the plant, a time-keeper, perhaps, who got over the plant pretty generally, who had a personality that would make it easy for him to get contact with people in the shop, and who had

enough literary style so that, under the editor-in-chief's guidance and editorship, his material would be acceptable, he was our first choice. We liked to get men who were Harvester men, or Harvester women to start with. On failure to do that, we went outside. In one case, we advertised and selected a man from the outside and then brought him into the shop. He was an inspector nearly a month before being made the editor. Satisfied with the man, we submitted him to the committee for approval.

Mr. R. G. McConnell (Defiance Paper Co.): What means have you of distributing the publication? Is it done by some individual in each department, or mailed, or how do you reach all of the people?

Mr. Young: We did not mail them. The distribution varied. We had seventeen different plants with the publications. In some they were distributed to the men as they left their work; in others, each department's magazines were sent to the employee representative in that department and he made the distribution. In others, they were sent out to the department foremen or department clerks and distribution was made, usually just before quitting time. We found that it was conducive to high pressure production to distribute the magazines about the close of the day rather than early in the day.

CONTINUANCE IN DISCUSSION AS TO WHEN TO PUBLISH

Mr. H. R. Zimmerman (National Cash Register Co.): I am particularly interested in the statement you made that you discontinued your publication because of business conditions. I have read quite frequently where editors claim that that is the very worst time of a publication. If it lives during times of adversity, then it is a real paper. In other words, that is the time that it is needed the most, to keep up the morale among your employees, let them know how conditions are.

Mr. Young: We had gone along for possibly 8 years as a manufacturing concern without plant publications and gotten along very satisfactorily. Our works councils were really responsible for our having works magazines, they came as a result of requests from the employees. We have always distributed the minutes of our plant council meetings to all employees, and they are still maintained. These minutes were later expanded into plant publications.

When we discontinued the magazines, it was not an arbitrary fiat of the management. It was put up to me to save that \$40,000, along with a good many other thousands of dollars that it was possible to save, not necessarily by discontinuing activities but by combining functions whenever possible.

Putting it up and discussing it in the way we did, we withdrew the magazines in the most inoffensive way we knew and one least hazardous to the success of the magazine upon their re-inauguration. I don't think there is a feeling on the part of our employees that the magazines were unnecessary. I know their discontinuance is a loss to them and that they are missed, because we have numerous inquiries as to when we will be willing to publish them again.

The magazines did not fail to fulfill their purpose. They were withdrawn simply because we had to save every dollar that we could, just as you and I would agree that it is cheaper to buy good clothes, yet if we went downtown with 20 dollars in our pocket and we saw a suit of clothes for 20 dollars and another 75 dollar suit marked down to 35, we would necessarily take the cheap one.

Sydney W. Ashe (General Electric Co., Pittsfield, Mass.): In the carrying on of these seventeen papers, did you try to develop the competitive spirit between the works?

THE COMPETITIVE SPIRIT

Mr. Young: We had a sort of unwritten rule that never would more than 30 per cent of the magazine be taken up with boiler plate material. We are a greatly diversified industry. We have our own timber properties, iron ore and coal mines, steam boats, railroads, blast furnaces and steel mills, and all sorts of things. Our method of selling the company to the extent which we did was to try to make the employees feel a part of a great, diversified family, and that constituted most of our boiler plant material, other than the announcement of changing personnel in the management. We had an unwritten law that never would any local magazine carry more than 30 per cent, and I don't think it ever approached 30 per cent.

The competitive spirit was not a direct competition, but just a constant striving of each magazine to outdo the other in its worthwhileness. In the preparation of my talk here, I went back over the files of those magazines, not having seen them for quite a while. I was really astonished at what I think was the literary worthwhileness of them and of their value to us as historical documents now. The competitive spirit is very evident. Each number seemed better than the preceding one. When a new development came in any one magazine, that was good, it quickly spread to the other magazines.

Mr. James (Chesapeake & Ohio): Just how much space did you devote to safety in those publications?

Mr. Young: Well, you see they carried Works Council minutes. The Works Councils all have safety committees, and in the minutes of the Works Council meetings there was usually a volume of safety items.

Aside from that, if there were careless practices to be preached against or criticized, we held it up until a time when we could legitimately criticize the management as well as the employees. We came out frankly—in criticisms of accidents where negligence of the foreman or the company was responsible.

I don't think that the total, considering that portion of the Works Council minutes and other safety propaganda, aside from illustrations or cartoons or photographs, would be over 10 per cent of the written part of the magazine. We guarded against having magazines denoted exclusively to safety.

A PROPERLY BALANCED AND WELL-EDITED PUBLICATION A NECESSITY IN SELLING SAFETY

L. G. BENTLEY, GENERAL SAFETY AGENT, CHESAPEAKE AND OHIO RAILROAD, RICHMOND, VA.

It may seem inappropriate, yet I must take issue with the subject of my paper in one respect. To state that a thing is a necessity, is to assume that desired ends can not be attached through any other medium, and I know of many industries wherein safety is being successfully sold without the aid of the plant publication.

If I may be permitted to slightly alter the subject, I will agree and ardently support the plea that "a properly balanced and well edited publication is a valuable asset in selling safety."

I am not asked to report as to what constitutes either a "properly balanced" or "well edited" plant publication and it is well that I am not expected to do so, for my efforts would result in a veritable "bringing of coals to to Newcastle" and dead coals at that. I am certain that this most important of subjects has been carefully treated by those of peculiar ability and training, who can say the last word concerning editorial efficiency and perfect poise of plant publications.

Let us assume that all plant publications, employees magazines, etc., are properly balanced and well-edited, and consider the means and methods whereby they may serve best as selling agencies for safety, not only to the employee personnel, but first to the industrial management which, it is agreed, is the prime essential.

May I briefly relate my own experience in developing a railroad employees magazine?

Some ten years ago, the Railroad with which I am connected, organized its first safety committee; I was appointed secretary and it became my duty to give suitable publicity to the various items sent in by the employees which, in their opinion, merited the attention of the general safety committee.

This publicity was accomplished by means of a safety bulletin of four pages, not mimeographed, but printed and freely distributed. The items printed in this bulletin were the safety suggestions above mentioned, with the names of the authors and such comment as was appropriate to show the final action taken thereon. Naturally some of these suggestions were so important as to require elaboration and eventually illustration, so that, in a few months our safety bulletin was increased to sixteen pages and each issue carried an illustration and full description of some hazard particularly productive of injuries together with advice as to accident prevention.

Within a short time, as our employees came to read and discuss these bulletins they developed personal interest and began to send in similar matter with request that it be printed in the "bulletin." We usually printed these contributions with minor changes, but sometimes, finding the material submitted particularly crude, possibly controversial in nature, we re-wrote it, staging photographs illustrating some specially valuable

idea and submitted the re-written article with photographs to the author for his approval. The fact that we went to the trouble to secure illustrations to go with his paper usually overcame any tendency he might have had to be "thin skinned" because of the surgical operation performed.

ARTICLES MUST APPEAL TO THE MEN

In the course of time, these contributions and comments became so numerous and educational that to properly introduce them, we were compelled to use a distinctive cover for each issue, and, when this was done, the employees insisted on sending in matter on subjects other than safety, so that as a result, we soon had an "employees magazine" of 88 pages, and treated in addition to safety, fire prevention, freight loss and damage, esprit de corps, home building and housekeeping, children's stories, etc., but safety was the dominating feature because the magazine was edited by a safety man, and was therefore undoubtedly a bit unbalanced.

In the course of time, because of the continued growth of the magazine and our greater responsibilities in accident prevention work, we decided to put the magazine in charge of a trained newspaper man, with such assistance as he might need to produce just what it is agreed a plant publication must be, properly balanced and well-edited.

We maintain a safety department in this magazine, edited much along the same lines as heretofore, but other departments are receiving the same advantages of publicity as the safety department; we feel in fact that it is a case of not loving Caesar less, but Rome more.

Every department head should feel the importance of his own particular work and sphere—they sometimes do, to the unfortunate extent that departmental enthusiasm encroaches upon co-operation; I hope I have not taken this attitude as to the importance of accident prevention, but, feeling that aside from the strictly humanitarian aspect of the thing, loyalty, esprit de corps, production, expansion and dividends are indeed largely dependent upon safety, I assert that accident prevention should be given representative space and dignified position in the plant publication.

Whether this representation and dignity may be best attained by embracing all safety matter within a regular safety department, or scattering it throughout the magazine, is for the editor to decide, I don't think it much matters, but I am certain that safety can not be sold to the rank and file through a plant publication by simply allotting a page or two each month to the safety department and printing in this space a safety lecture for the general safety officer, a monthly statistical report or an article clipped from another periodical.

I do not believe that a plant publication should be relied upon entirely, as a selling agency for safety through publicity. It is often necessary to produce such an article or bulletin on short notice, and the plant publication issued but once in thirty days, and sometimes less frequently, brings such items to the rank and file as dead issues. The plant publica-

tion should be supplemented by specialized safety bulletins, pamphlets, flashes, etc., from time to time, so adapted as to meet the peculiar needs of the occasion and strike while the iron is hot.

An occasional communication, frank, ringing with sincerity, covering some live issue of the day, signed by the president, should be displayed in the plant publication in such manner that both the official and employee personnel may know that safety is not subordinate to any other feature of operation.

AROUSE INTEREST BY EMPLOYEES' CONTRIBUTIONS

Safety matter should not consist of too many sermons; preachments of this kind do not sink deeply into the minds of the workmen. Editorial comment, instructions from headquarters and such matter should be written in the language of the men presumed to assimilate them. These are days of stern reality, therefore let us write to these men, not from dreamland, but from the other side of his machine, desk or locomotive. The men who work may not be the highest exemplars of the fine arts, or students of classic literature, but there is an art about their work with which they are entirely familiar and the editor might, to his own advantage, take a few days off and study his subjects amid the whirl of the flying machines or the deafening roar of air hammers and anvils. The ideas in the heads of these workmen are nuggets of true color which ought to be polished and refined for broadcasting throughout the plant.

The prize purpose of the plant publication is to get the workmen to look forward to the day of its appearance, to make it of such moment to them that they will discuss it with others and induce them to become interested, to carry it home with pride and place it with the evening paper on the center table for the family to read. If this is the true purpose and function of the plant publication, why not encourage workmen to send in their golden nuggets of thought? There are several extremely valuable angles to the scheme of printing material from the pens of the rank and file.

An employee, to prepare such a paper, must think, study, originate ideas and strive to excel, thereby broadening his perspective, cultivating the spirit of advancement; if the editorial staff finds it necessary to polish it up a bit, so much the better. I have found but one man who objected to this, and his objections were soon quieted; I am strong for illustration; an ingenious staff artist or photographer, can find some thought in every one of these contributions which will be strengthened by judicious illustrations. If the illustrations are posed photographs, an impression is made on those who are photographed, for the purpose of the picture should be thoroughly made clear to them; bystanders catch the significance of the pose, and together with the principals in the picture, look forward to the issue carrying this matter, and so, not only is interest excited because of the immediate performance, but real incentive is offered all concerned, even friends and acquaintances, to credit the magazine with its true character and recognize it with pride as "their magazine."

I know of no more fitting illustration of the principle I am trying to describe, than to ask you to go with me in memory to an old fashioned experience meeting such as you have all attended, without doubt. You will remember that it was not alone, nor in major part the carefully chosen, correctly spoken words of the preacher, that brought the sinners to the mourners bench—it was his ability to get old Bill Jones on his feet way down in one corner of the meeting house, or Aunt Suisie Stokes to arise in her seat and relate the particular influence which brought them into the fold of the redeemed—the few sincere, outspoken simple words from these honest hearts became the emotional symphony which caused your pulse beats to become more rapid, your heart to respond to the highest spiritual ideals and your mind to register a resolve that true happiness lies only for those who live Godly lives. Oh! for the return of the good old fashioned "experience meeting," before we became so dependent upon paid specialists to do our moral thinking.

SPEAK TO WORKMEN IN THEIR LANGUAGE

Liken your safety department to the experience meeting and you will find your columns filled with live, instructive, intelligent matter, developed through personal research of the men on the firing line.

The opportunity of the editor lies in the editorial column, where discussion of such contributions as those I have referred to renders them but the more valuable. Take this matter home and answer this—what one of you is there who does not feel pride to find some child of your brain quoted and commended in the editorial columns of your most important home newspaper.

I am a great believer in the strength of a striking illustration, particularly an educational illustration on the cover of the plant publication.

These illustrations ought to be changed each issue and so adapted that each department may in turn be represented. As an occasional safety cover, nothing, in my opinion, can sell safety to better advantage than such a drawing as that reproduced on the *National Safety News*, recent issue entitled "Please give me a new handle Bill." These drawings and photographs may not be as artistic as a setting sun, a field of waving grain, a range of snow-capped peaks or broad view of peaceful waters, but they have the kick that appeals to the man who is using tools and suggest to him the danger of working with hammers and sledges with broken handles, and that is the man to whom you want to sell the safety idea, not the prospective passenger who may, by reason of some particularly attractive scenic portrayal, be induced to ride your railroad or visit your plant as a possible purchaser.

The publicity is not entirely deaf as regards the appeal of such material as I advocate publishing in plant publications as selling agencies for safety, nor is the press callous to industry's efforts to provide employees with safe conditions and educate them in safe practices, and I am sure it is sensible publicity such as this, that is gradually denting the hardshells who have moaned so loudly of the heartlessness of corporations;

they are beginning to see that industry is more thoughtful of workmen and public carriers more painstaking in protecting patrons, than such patrons are in taking care of themselves.

The plant publication in safety, as well as in many other ways, occupies a most important position, and has the golden opportunity of bringing employer and employee more closely together, of letting them see each other as human beings, of acquainting each with the others problems, of inspiring admiration for each others commendable accomplishments and sympathy for their honest failures.

DISCUSSION

Mr. Orr (National Malleable Castings Co.): Some time ago, the National Safety Council furnished a cartoon service which was used in a number of papers, and I used it in ours. They were cartoons pure and simple. I wonder what the opinion here is of those cartoons.

Mr. Bentley: I am not very strong for cartooning safety ideas. I think safety is a very serious subject and should be handled in a serious manner and not be made a matter for a joke.

R. F. Thalner (Buick Motor Co.): We had the same experience at our plant with respect to the cartoon calendar which was published by the National Safety Council. A few of our plant managers thought that this proposition had gone beyond the stage of comedy and was a serious proposition.

J. Ride la Torre Bueno (General Chemical Company): I think that as a general principle, we may properly feel that if safety is such a poor subject that a joke will kill it, it might as well die here and now.

Mr. Ashe: We have been publishing our little paper for about 10 years now, and in the early stages, when we were trying to introduce safety, we introduced one or two cartoons. After a little while, I felt the same as he did about it. I think that you can arouse somewhat of a little different reaction by using a poem occasionally. I think you can get better results than you would from a cartoon.

I also like a single picture cover. We don't usually go in for quite such ornate covers as the one I have in my hand, but this happened to be a convention number and was very attractive.

Mr. A. B. Drummond (Wilson & Company): It seems to me that the cartoon is properly used on something which represents an elementary idea in safety, something that everybody ought to know. If something obvious is brought out cleverly, we make a very good point in holding the thing up to ridicule in order to prove the seriousness of the matter.

Mr. Strickrott (Adirondack Power & Light Co.): It seems to me there is some merit to the question of cartoons in safety. When you speak about the seriousness of the subject, it seems to me that there is probably nothing more serious than the subject of matrimony, and that probably has been cartooned more than any subject. Yet I think any married man sees a great deal of humor in many of those cartoons.

When it comes to the question of putting the safety idea across, what you are trying to do is to make an impression on the man's mind, and any way you can do that I think is good form. Some men you can reach with a written article and they will read it; other men will read a poem; still others will look at a picture that is particularly designed to convey a safety message and they will get something from that. Others will get something from a cartoon. I think there is a limited field for cartoons in safety.

Mr. W. D. Price (Warner Gear Company, Muncie, Ind.): I would like to know just what advantage there is financially, in a plant publication in a plant employing about a thousand people?

THE ECONOMIC ASPECT OF A PLANT PUBLICATION

Mr. Close (Commonwealth Steel Co.): I don't think I can answer the question exactly, but I might help a bit by saying a word about our publication, *The Commonwealther*. It started purely as a safety paper for distribution among our men in the plant, and now we publish two papers, one which is mailed out, and one we call the "home edition" which we limit entirely to the plant.

Our clientele is entirely among locomotive builders and railroad men. When we send out our regular magazine number of *The Commonwealther*, in addition to distributing it among our men, we also distribute it among perhaps thirty-five hundred railroad men, and we do it from this point of view that we try to make our magazine a medium of tying up the relationships of our company in different directions, not only relationships between the men in the plant and the management but also the relation of the management to our customers.

We try to cover a rather wide field, but we do it in this way—by presenting in our paper the spirit of our organization, by trying to show railroad men that we have such a spirit in our organization, that we practice fellowship, that we run our plant on a golden rule basis, in such a way that the railroad people, when they want to buy stuff, will feel sure they are going to get what they want if they go to the Commonwealth. We find that our railroad friends are interested in the home talk of the company, they are interested in knowing what we are doing there in the way of safety.

Our president always sends a letter out with our paper, and we get replies. Sometimes we get a hundred or more letters from men expressing appreciation of it. Our president and our management feel that our plant publication more than pays for itself in indirectly influencing railroad men, locomotive and car builders, favorably toward our organization and toward our product, and that it creates a confidence in us which makes our company willing to spend considerable money in getting out the publication.

Mr. Bueno: That question has been on my mind for ten years, and thus far the only thing that approximates an answer is this: Can you trace any decrease in labor turnover to the efforts of your publication? If you can do that in any way, you have a yardstick. It seems to me

that if through your magazine you can give strong life to esprit de corps and loyalty, you will reduce labor turnover materially, and that is about the only gauge that will show anything.

Of course, it seems to me that if we can get our publications into the homes of those to whom they are ostensibly addressed, we are certainly doing very much toward increasing loyalty to the organization, and that, of course, reflects itself in a decreased labor turnover.

Mr. Ashe: I think that you can do a great deal in the matter of costs by comparing the expenditure of your paper with what you are doing on other things. As an illustration, take large industries that are carrying on educational schemes, group insurance plans, and things of that sort. You would probably find as a rough estimate, comparing with our own experience at Pittsfield, that you are spending probably about \$9 a year per employee on your group insurance. Then you are probably spending about \$6 a year on your accident compensation per employee. You are probably spending about \$2 a year per employee on your educational work. You are probably spending about \$1 a year per employee on your plant paper. A good many of these papers, as well as our own, originally started on a pure safety basis. You could try to work out, on that basis, that you were going to cut your accident expense, and if you were introducing your paper at a time when you were doing very little in other educational lines to reduce accidents, so there would be the newness of it there, you would find it very effective. You would be fairly safe in claiming that you could cut your accidents 20 per cent that week. I think it is good to get it down to a comparative basis.

You can say, "Here, all I am spending is \$1 per employee per year, which is about what it costs us to put out our paper. That is a nominal amount compared to what you are willing to spend on other things.

SOME PROVED METHODS OF PRESENTING SAFETY AND HEALTH THROUGH PLANT PAPERS

E. T. WILKINS, EDITOR, SCHENECTADY WORKS NEWS, GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

Several hundred editors of employees' magazines were recently asked why their publications existed. Two hundred thirty-nine said, "to better the esprit de corps;" 167—"to explain the policy of the house;" 165—"to encourage pride in work;" 139—"to prevent accidents;" 98 said "to increase production." Many other reasons had one or more followers, while a few editors confessed frankly that they did not know why they were publishing an employees' magazine.

Have you ever stopped to ask yourself this same question? In other words, what are you trying to accomplish by publishing your employees' magazine or plant paper?

Unless an editor endeavors to carry out the true functions or the fundamental principles underlying an employees' magazine, he will surely meet with failure. Many employees' magazines have expired after a short duration through immature consideration of their need for existence or inadequate attention after commencement.

On July 1, the New York State Industrial Commissioner, Bernard E. Shientag issued a report in which he stated, that during a nine year period, the industrial accidents in this state totaled more than 2,500,000, an average of about 300,000 a year. The total number of reported deaths from industrial accidents during the entire period is about 12,480, an average of 1,300 a year. Claims for compensation during the entire period totaled about 300,000, an average of about 35,000 a year. In recent years, however, because of wider application of the law, claims have averaged about 60,000 annually. The discrepancy between the total number of accidents reported to the state department of labor and the total number of claims for compensation, the review explains, is largely due to the fact that all accidents do not come in the compensation class, no compensation, beyond medical treatment, being allowed in cases where the disability is less than fourteen days.

COMPENSATION FIGURES

Compensation payments have averaged about \$13,000,000 a year over the nine year period, each successive year showing an increase, with the highest total payments reached during the war years of 1917 and 1918 when the industries of the state were going night and day. For the past two years, compensation payments have been at the rate of about \$15,000,000 a year. The report lays emphasis on the fact that the \$125,000,000 compensations were paid out to claimants with very little reduction for lawyer's fees because only in rare instances are lawyers retained in workmen's compensation cases.

These are startling figures to be reported by simply one state in the union. How many industrial accidents has your state reported? It rests heavily on the shoulders of every editor here to try to reduce the total number of industrial accidents not only in his own plant but in his own particular state through his plant paper or employees' magazine. If each editor, through the influence of his paper, can save the life of one employee he will have been amply repaid for issuing his magazine.

Here is a challenge flung by "carelessness" to every editor within my hearing today:

I am more powerful than the combined armies of the world.

I have destroyed more men than all wars of the nation.

I am more deadly than bullets. I have wrecked more homes than the mightiest machine guns.

I steal in the United States alone over \$300,000,000 each year.

I spare no one. I find my victims among the rich and poor alike, the strong and weak, widows and orphans know me.

I loom up in such proportions, that I cast my shadow over every field of labor from the turning of the grindstone to the moving of every railroad train.

I massacre thousands upon thousands of wage earners within a year.

I lurk in unseen places. I do most of my work silently. You are warned against me but you heed not. I am relentless. I am everywhere—in the home, on the street, in the factory, at railroad crossings and on the sea.

I bring sickness, degradation and death, yet, few seek to avoid me.

I destroy, crush or maim; I give nothing but take all.

I am Carelessness.

Can you as an editor, sit at your desk and let this challenge go unheeded?

Can you as an editor issue an employees' magazine oblivious to the obligations of your paper to help stop this human waste in industry?

My mission here today is to submit for your consideration 21 proved methods of presenting safety and health through plant papers. How many have you tried? If I can suggest one or two methods which you have never used but will try in your plant paper, I will feel that I have been amply repaid for preparing this paper.

COMPETITIVE CAMPAIGN. Start a competitive safety campaign between departments. Have the manager issue a letter through the plant paper to all employees, explaining the purpose and rules of the campaign. To stimulate interest in such a campaign and to award sections, or departments having the lowest percentage of accidents each month, offer cash prizes. One concern made the following offer: To the factory section having the lowest percentage of time lost due to accidents during the month, will be awarded \$15, to be applied to the Mutual Benefit Association. The Mutual Benefit Association referred to is a sick and death benefit fund organized for the benefit of the employees of which there are 100 sections in this particular factory.

SAFETY PUZZLE PICTURES. Run a series of safety puzzle pictures. These puzzle pictures are made from blueprints, reproduced from photographs taken of some hazard in the plant. The artist makes a pen and ink rendering of this blueprint and a line cut is made from the drawing. The puzzle is made by allowing the artist to make ten errors in the drawing. This is done by eliminating a foot, a hand, a vise handle, an eye, putting in a false shadow, etc. The employee who sends in the correct solution of each safety puzzle receives a cash prize, which amount may be determined by the editor.

AWARDS FOR SUGGESTIONS. Offer rewards for safety suggestions. Many practical safety suggestions are made through the suggestion system. A photograph of the individual making the suggestion can be played up in the employees' magazine together with a write-up of the safety device which he has suggested. The amount of the award made to him should be liberal to encourage more employees to make similar suggestions. Those desiring to investigate further into the safety suggestion system, will do well to secure a copy of "Safety Practices Bulletin No. 40" issued by the National Safety Council.

EDUCATIONAL ARTICLES. Publish Safety articles pertaining to the eye, hand, foot and body. For instance, the eye; show by diagram how this

delicate organ is constructed, explain its care, how it should be guarded by goggles when chipping or grinding material, etc. Another article can be prepared on the manufacture of artificial eyes, and a safety motto can be added. The hand, foot and body can be interestingly treated in the same manner. The cause of hernia or rupture can be explained with safety suggestions.

ESSAY CONTEST. Arrange for a Safety Essay contest. An essay contest which proved very valuable to one concern was entitled "How to Avoid Shop Accidents." Three prizes were offered for the best essays submitted. Pictures of the winners as well as the text of the winning essays appeared in the Employees' Magazine. In this connection, it may be of interest for you to know that on Sept. 15, the Highway Education Board, Washington, D. C., announced the renewal of its annual safety contest in which \$6,500 will be given away in prizes. This is the third annual safety campaign and takes the form of two contests, one among elementary school pupils and another among elementary school teachers. Approximately 500 state and national prizes are to be given for the best essays and lessons written. The subject of the essay which children are invited to write is "Highway Safety Habits I Should Learn." The contest opens with the beginning of school and closes December 4, 1923. In the two previous years, approximately 400,000 pupils and 50,000 teachers have participated each autumn.

It is believed by board officials that the cumulative effect of these contests and the increasing attention given to safety education will result in even a greater number of participants this year.

COMPANY RULES. Publish company rules regarding Safety in the plant. This should be done at least once a year in order to give the employees and idea that the company is back of the Safety First movement. You may say, "we publish this in booklet form and give it to our employees." but it should be reprinted in the employees' magazine.

INJURY PICTURES. Publish photographs of employees showing how they escaped from being hurt or injured. This causes considerable interest among the readers of your paper and besides photographs help to break up the solid type matter. In no case publish gruesome pictures of accidents in your paper.

SAFETY NEWS STORIES. Prepare news items about safety conditions in the plant. One magazine published a story showing that it was more dangerous to go fishing than to work in the electrical plant.

CHARACTER FIGURE EDITORIALS. Introduce a little character figure or gnome to talk to the employees each month. This was a feature used in the "Solvay Life" and introduced what was termed "Safety Annie." Another employees' paper is running a Genie figure which has something to say to the employees in each issue on safety and other subjects.

CARTOONS. Use cartoons. There is a right and a wrong way for doing everything. Cartoons can be drawn showing these two ways. The National Safety Council has prepared some very good cartoons that are available to all editors upon request.

EDITORIALS. Editorials may be prepared impressing upon the employees the idea of the Safety First movement and the prevention of accidents. These editorials can be based on conditions in the plant, in the city, in the street car or in the nation. An editorial written on the first Safety Regulations may be of interest. Turn to your Bible, in the book of Deuteronomy, twenty-second Chapter, eighth verse.

"When thou buildest a new house, then thou shalt make a battlement for thy roof, that thou bring not blood upon thine house, if any man fall from thence."

King Solomon, of Israel, gave the following wisdom which is found in the third chapter Proverbs, Verses 21 and 23:

"Keep sound wisdom and discretion—Then shalt thou walk in thy way safely and thy foot shall not stumble."

That safety was acutely practiced in ancient times and that penalties for non-compliance with safety laws were carried out, is shown by the following extract from laws of King Hammurabi of Babylon, who died in the year 2185 B. C.

"If a builder build a house for a man and do not make its construction firm, that builder shall be put to death."

That is the oldest safety law known which has a definite penalty for its violation.

The great sage and moralist Confucious, who died in 478 B. C., gave the following bit of safety advice:

"The cautious seldom err."

Safety admonitions may be found also in the writings of William Shakespeare, Victor Hugo, Benjamin Franklin, Abraham Lincoln and many others.

Have cuts made from the yearly Safety Calendar illustrations prepared by the National Safety Council. Run these cuts in your employees' magazine.

RECOGNITION OF SAFETY ACCOMPLISHMENTS. Recognize the individual who has prevented an accident by publishing his picture. Give a good write-up of the way the hero saved a life.

SLOGANS. Run Safety Slogans between articles in your employees' magazine or at the top or bottom of the pages. To secure the interest of employees, slogan prizes can be offered for the best safety slogans submitted in the contest. Safety slogans may also be secured from the National Safety Council.

EXPLANATORY ARTICLES. Explain the hospital facilities in your plant and what your visiting nurse is doing, if your concern employs such a person. It would be well to have some photographs taken of your hospital to illustrate the article. Keep in close touch with your industrial physician and he will give you many ideas for articles to be written about emergency hospital work.

HEALTH ARTICLES. Publish health articles. Have your industrial physician prepare these articles or secure them from your state Health Bureau.

Every Friday night the New York State Health Bureau broadcasts health talks from W. G. Y. These talks are timely and valuable for publishing in an employees' magazine. If you will write to the bureau, they will be glad to place your name on the mailing list and to receive these articles as soon as they have been broadcast.

PERTAINING TO THE HOME. Publish safety and health articles pertaining to the home. As every editor is anxious to have his paper taken home here is another point of contact. These articles could also be based on safety while walking in the streets or driving automobiles.

GRAPHIC CHARTS. Use graphic charts to promote the safety idea. These charts may be targets, diagrams or score boards showing comparisons between departments in the number of lost time accident cases. The following article recently appeared in one of the employees' magazines entitled "What Happened to 'Bill' Last Year" and was illustrated with an outlined chart of Bill.

COMMITTEE REPORTS. Reports of Safety and Health Committees within and without the plant make good safety and health news. Recently we had experts from the Harvard School of Public Health make us a visit with the idea of determining the health conditions surrounding the workers in our plant and of suggesting ways and means of improving conditions. This report made interesting reading for the employees.

USE OF POETRY. A story of safety may be told in verse. Here is a verse which is one of many which I have used. It is entitled "It Makes You Pay."

"Do you ever stop and wonder
As along through life you blunder,
Taking useless chances every day,
How it is that you're still working,
While your safety you're shirking?
Carelessness is sure to make you pay.

Stop a minute now and ponder,
Life you can't afford to squander,
Taking useless chances every day,
Watch yourself and fellow toilers,
Those that don't care are all life's spoilers,
Carelessness is sure to make you pay."

SPECIAL COLUMNS. Introduce a "Don't Let it Happen Again" column. In this column may be given an informal account of typical accidents in the shops over a certain period that could have been avoided and giving warning to other employees not to have the same accidents occur to them.

I have reviewed with you briefly 21 proved methods of presenting safety and health through plant papers.

You may now ask, "how can I use the 21 methods in my paper to best advantage?"

To this question I would make the following reply. Try out the various methods in the order as given above or combine two or three methods in one issue, but no more. An editorial, a cartoon and an announcement of winners of safety suggestions make a good combination. An editor should use his sense of proportion in the makeup of his plant paper, the same as a good cook uses the correct proportions in seasoning food.

Too much talk in one issue will be boresome and will not accomplish the results desired.

Do not centralize your safety material on one page. Personally I do not approve of having a certain section of your plant paper devoted to safety material. The best way to handle it, is to scatter the material well through the paper.

Have every issue of your publication carry some method of promoting the safety habit for it is the constant hitting the nail on the head that is going to drive the safety educational work home to the employees.

At this point, let me throw in a suggestion. Every editor to get the right angle of safety, should be a member of the safety committee in his own plant.

The Safety and Health movement deserves the unqualified cooperation of every editor here. Not the kind of cooperation described by Rastus when he defined the word "cooperation" by saying that Mrs. Rastus took in washing to support the family while he "jes cooperated," but the kind of cooperation that means rolling up the sleeves and getting right into the work by observing every opportunity to tell and show others through the employees' magazine how to acquire and practice the safety habit.

DISCUSSION

Mr. Spencer Hord (Eastman Kodak Co.): I would like to offer one little plan that worked out fairly well with us as regards the safety campaign. We inaugurated an essay contest for the children of employees. We offered prizes of fifteen, ten and five dollars. For prizes below that, we utilized a safety game. It was very similar to the game of parchesi. As a matter of fact, everybody didn't get a cash prize, but everybody who sent in an essay got one of those games. That was about three years ago, and I understand every one of those kids is still playing that game.

Mr. Strickrott: I think one of the best classes of material you can get is the story of the man who was injured by himself. We were able to do that this spring, and we gave the article the title, "The story of a man who was pronounced dead." This man, through his own foolishness, was electrocuted. The doctor was called into the plant, and when he arrived there, he pronounced the man dead. The men then got busy with the prone pressure method of resuscitation and brought the man back to life, and after some three or four months, he again went back to work and is still working with us.

I asked him to write the story of what happened, and he said, "Well, all I can say is that I was a fool doing what I did." I said, "Then say

that." In his own words, he did tell his story of how the thing came about, what he did, the sensation of getting this shock, as far as he knew it, and the story of his recovery.

Mr. Ashe: I would like to say a word to supplement the last two speakers. While I have given a large number of prone pressure resuscitation demonstrations during the past ten years, and while we have resuscitated about eleven people at Pittsfield, it was only last spring that I had the privilege of bringing a man to myself. I worked on that man about three-quarters of an hour. He was overcome with gas. It was a very interesting experience. Afterwards, we posed the man with a nurse and myself, and we used the photograph in our paper as well as a description of the talk.

The important thing, as the last speaker said, is the combination of the news value and the illustration, plus the personal feature. You can put it in that way as a news article, and there are any number of companies who have had similar experiences.

When you can get hold of material of that type, it certainly has a factor of interest, and many people will come around and want to get further instruction. That is really the test of your material, the reaction you get from it.

Mr. G. H. Shaw (The Northern Ohio Traction & Light Co.): One of our interurban conductors went to a telephone and the wires were mixed up at high tension, and this conductor was apparently electrocuted. There was considerable confusion. No one knew just what to do. But on a passing car there arrived at about that time another employee, who had taken some interest in prone pressure resuscitation. He ran over and after working about 15 minutes, brought this conductor around in fine shape.

We hold trainmen's meetings every month. All the trainmen are there. Immediately following this experience, we had our meetings, and I gave those men a thorough demonstration and explanation of the prone pressure resuscitation method. I had this conductor attend the meetings. I followed that up in our magazine with a brief description of the accident, pictures showing the rescuer, his home, and all the little incidentals. It was one of the most effective things that I have ever used.

Miss Margaret Stevens (Baltimore & Ohio Railroad): If we can get our safety message across in the home that we will be doing a whole lot. Thus far we haven't been able to do very much in getting the safety message across to the homes through the women's department because I think we have not emphasized it enough, but I really do think that it is very important.

We used a children's contest in our magazine last year, and we asked each child to make a list of all the things he did for safety each day for 30 days, and this had to be signed either by a parent or by a teacher to certify that it was all right. Then we gave prizes to the children who had done the most for safety.

OFFERS PRIZES TO SCHOOL CHILDREN

Mr. Close: Our company has offered prizes for all of the schools in Granite City, Ill., where our plant is located, for the best essays on safety. We are offering a cup for each of the schools. The child who writes the best essay has the privilege of having his name engraved and inscribed on the cup, and then it goes on from year to year. We are planning to make a feature in our paper of the best essays which are written by the school children, if they are good enough.

FRIDAY AFTERNOON SESSION

Chairman Augustus: We have with us, and we feel very highly honored to have him, Mr. DeBlois, who is the new president of the National Safety Council.

Mr. DeBlois: I believe we will take away from this Congress tremendous inspiration to do better and more consistent work than we have ever done before. I am not a plant publication man, and I am not at all familiar with your individual problems, but I know there is much that can be done in your section to keep up interest during the year, much that you, individually, can contribute to the National Safety Council, and much that you can draw from it to help you in your own problems.

An organization such as this gets its headway only from sheer weight. I think we are all very happy over the success that we have had heretofore, the progress that we have made in accident prevention, but we never could have attained, individually, the distance that we have gone over. It was a mass reaction that has brought us to this point.

REPORT OF COMMITTEE ON BY-LAWS

J. R. BUENO, CHAIRMAN

In the first place, any by-laws we adopt are subject to the approval of the council. One of the things that has to be considered in the by-laws is the name of the section. It is called the Plant Publications Section at present, but that seems to be rather limited in scope.

The second thing is the object, which, of course, we all know.

The next question is the officers. The usual sectional officers are a chairman, vice-chairman and a secretary. There are three standing committees. One is an executive committee composed of the chairman, vice-chairman and the secretary and two members at large, who are elected by ballot at the annual meeting.

The other two standing committees are a nominating committee and a program committee; the nominating committee to consist of three and to consider possible candidates for officers and report at the annual meeting. This committee, in the view of your committee on by-laws, should be an elected committee.

The other committee is the program committee. This year, our vice-chairman and chairman have worked hard to get up this program, with entire good will on the part of all of us, but I don't know how much

substantial aid and comfort we gave them aside from that. This program committee has got to work throughout the year preparing the program and doing the work, and of course it is then submitted to the executive committee. The executive committee manages all the affairs of the section during the year.

We beg to submit that as a form of report to be adopted at this meeting, subject, of course, to being reduced to writing at an early period and subject also to the approval of the National Safety Council officers.

(Report approved.)

REPORT OF NOMINATING COMMITTEE

E. T. WILKINS, CHAIRMAN

The committee nominated for Chairman Sydney W. Ashe, editor of the *Current News*, General Electrical Company, Pittsfield, Mass.; for vice-chairman, Miss Margaret Stevens, associate editor of the *Baltimore & Ohio Magazine*, Baltimore, Md.; for secretary, A. J. Strickrott, editor of the *Synchronizer*, Adirondack Power & Light Co., Schenectady, N. Y.

The candidates named by the nominating committee were unanimously elected. Ernest Augustus, Mead Pulp & Paper Company, Chillicothe, Ohio, and H. R. Zimmerman, National Cash Register Company, Dayton, Ohio, were elected executive committeemen at large.

SIMPLE ECONOMICS FOR EMPLOYEES

DR. F. L. RECTOR, NATIONAL INDUSTRIAL CONFERENCE BOARD, NEW YORK CITY

I am firmly convinced that employers need educating on economics as much as employees, and sometimes it seems almost to a greater extent.

The National Industrial Conference Board, with which you are all doubtless familiar, has made a great many studies on economic questions and has reduced those studies, as far as may be possible, to statistical form, and from there into the form of charts and other methods of expressing those results.

I was told by the man who had this work in charge in our organization that about a year ago he sent out four or five hundred letters to you people and others like you, offering the services of these charts to the plant publication editors, to see that they would have each month a chart of different material accompanied by approximately 500 words of text that could be used in explaining the chart and in writing up the subject in the plant publication.

The General Chemical Company in New York took advantage of this, and to date has been using this material regularly. As one who has spent considerable time in research work, I think that I know something of the value of statistics, not only of economics but of all other kinds, and the more time you spend in research work, the more you will value reliable statistics and the more you will come to realize how hard it is to get statistics that tell the story as they are supposed to tell it and the story that they want to tell. It is so easy to slip up on some of those things. But when you have your statistics, it is also very evident

that you will find a great many people who do not appreciate them and do not understand them as they stand in their statistical form of tables and such ways of expressing them as that. And so we have the different graphic methods of charting statistics, either in the form of line drawings, in the form of blocks or circles, or any number of ways that have been devised for showing the relation of one group of information to another.

It is always well, I think, to give your people, whoever you are trying to meet, your employees or your employers, the opportunity to visualize a thing in more than one dimension. You have a table of figures before you that gives you an item in one dimension. If you have it in the form of a graph, either in the form of columns or of line drawings with peaks and valleys, you have your two dimensions, and the third way may be the method of employing blocks or solids or cubes. I saw a very fine demonstration of that recently by Mr. Dietz, the president of the Bridgeport Brass Company, of Bridgeport, Conn. He has assembled a large amount of information for his employees in the form of blocks painted different colors, different sections of them. They are about three inches square and have the different colors across them showing the different things that he wants to bring before these people. In presenting this material, he said that he felt it was much more easily comprehended by the average worker in the factory, when he had something that had dimension to it and volume, so that he could handle it and could see what it was in comparison with the material that he was handling in his own shop rather than the form of tables or charts.

HOW TO PRESENT STATISTICS

It seems to me that there are three or four things that we should have in mind to accomplish in the presentation of our material. For the people like yourselves who are assembling this material and using it, it would be necessary to determine the kind of economic facts that it is desired to transmit to the workers. That is the first thing that you want to determine. The second thing is to establish contact with the sources from which this information may be drawn, and this may be either from within or without the industry.

Third, present these facts in the way most easily comprehended by those for whom they are intended.

Fourth, make some practical application of the information displayed to the work and processes carried on in your plant. The nearer you come to making this a home affair, the more valuable it is going to be; just as you realize the more you can get of the personal touch and the plant touch into your plant publications, the more interesting they are going to be to the workers.

It is extremely important, that we present constructive rather than destructive information to your people. I mean by that a situation like this possibly arising—you want to tell something of the trend of the hours of work, the number of hours worked per week. You can do that in two or three ways. You can show the declining rate of the longer

days. That I don't think is advisable. You can also show the increasing rate of the shortened work week, the forty-eight hours or forty-four hours, or whatever it is.

I could go ahead and talk about that for quite a little while, but I find it is so easy for well-intentioned but misinformed people to take information of that kind and stress the wrong thing. They are both 100 per cent true, but what is the use of saying that there were 500 people killed at a certain time if in a similar length of time 5,000 people were saved by doing something else? I think it is always best to present constructive information.

CHARTING A COURSE

J. JAY FULLER, J. JAY FULLER ADVERTISING, BUFFALO, N. Y.

Before launching into the subject of the technical course to be charted for a plant publication, I want to say just one thing, that probably because it is so elementary is passed up in all of the so-called "educational" instructions for launching, planning, and picking up material for house-magazines.

In the first place, a house-magazine should move definitely and positively in its contents and in its policies from one point to another point. In other words, the very fact that a house-magazine needs to have a charted course implies that it should move positively and definitely along that course. The trouble with most house-magazines is the fact that they pick you up, whirl you around in the mental ether a few times and then set you down exactly where you were before.

If you are trying to tell your reader the story of your plant, you have to definitely pick him up, carry him on and finally set him down with a comfortable jolt if he is going to be conscious of the fact that anything in particular has happened.

We are conscious that the most beautiful and striking design usually conceived for the cover of the average house-magazine is a wonderful view of the front entrance to the factory. In as much as "Jimmy Jones" leaves and enters that same factory every day in the week, the vision of the entrance in all its resplendent glory has not moved Jones' mental processes very much in the direction you are trying to lead him. If you have a vision for this particular factory in which you want the participation of some two or three hundred of Jimmy Joneses, you had better get your idea in the hands of some more or less capable artist who can visualize what you expect the plant to be some ten, fifteen, or twenty years from your story. Then will you get the attention of your reader.

This is a matter of policy but it is elementary enough to be placed with the matter of illustration, copy, plan, text and all of the many other descriptions which are applied to the separate parts of a house-magazine. For instance, if it becomes your delightful privilege to announce the fact that a baby boy has joined the family circle of the Jones', you will probably get by with saying that Jimmy Jones has had a baby boy at his house and that the entire force congratulates him. But, if you want to actually gain the interest of all your readers, you had better say that

Jimmy Jones has created a new superintendent for the riveting department who will some one of these days take his place with the X. Y. Z. industry. The more human the touch, the more interesting is the story to your reading public.

THE DUMMY

The dummy should emanate from your printer and not from your own desk. There may be men who edit house-magazines of great scope and vision, whose copy is alluring and who, at the same time, are authorities on the technicality of printing. I will be frank to say that I have never met one. The greatest writers of "he-man" copy that I know are the poorest authorities on printing.

I have never thought that a man could chart a course for a house-magazine and do it successfully and have very much time for learning the technical details of the printing and paper business. If you know all about the sizes, weights, description and economical cutting of paper, you are fortunate, although it will not contribute greatly to a house-magazine producer.

Your start, in my estimation, in preparing the dummy is in the Treasurer's office of your company. Know in the beginning how much money you are going to have to spend for your house-magazine and, with this information, you can go to your printer or printers who are to compete for the job and let them estimate from your figures and compete for maximum quality and quantity. About one-half of the time of a house-magazine novice is spent in getting printers' estimates based on various imaginary specifications. Your printing competition should not be on the basis of figures. It should be on the basis of getting the most for a definite figure—which should be the most generous one, of course, which you can persuade the board of directors to pass for your project.

Having determined how much house-magazine you can buy for your money, you should secure from your printer a dummy in blank which takes the measure of what your craft is going to be. Then you can look around for rigging and trimmings in the way of type, etc. Here again is an element for which you had best lean rather heavily on a good respectable printed—mixing his ideas with your own commonsense and judgment. Kindly bear in mind that all printing is fundamentally intended to be read and read easily, all sorts of fine typography notwithstanding. If the course of your house-magazine is to be directed toward (and it probably will be) a lot of red-blooded "he-men" of average intelligence and a few of lesser intelligence, don't waste any time in studying the value of Italian Renaissance borders.

Get your story into vigorous, readable type. Bear in mind always that there are some of the boys in your organization who wear glasses in the evening and that the physician in your plant or the man who examines the men occasionally, may surprise you with the fact that some of these boys are not able to read any great length of time without being tired. You may have to get over your story to a great many of the boys in headlines or pictures.

SELECTION OF TYPE

I am not going to give you a great many rules for the selection of type. Not one man in a hundred could tell you, if you put them side by side, that Goudy Bold was a comparatively recent creation and that Devine Old-style was a very old type and very much out of date. Either one, consistently employed, would probably tell the story as far as your reader is concerned.

There is another little thing that belongs here in the matter of the dummy. It should be appetizing in its appearance. The clever advertiser, who sells food in the pages of the Ladies' Home Journal makes the pictures of the stuff good enough to eat. It may seem a little like a bromide to have to repeat this statement but when you see four out of five house-magazines set in fine eight or ten point type—sometimes four or five inches across without a break, you can understand that the editor has not made his stuff into very appetizing reading.

I like a magazine like the *Kodak Magazine*, for instance, running two narrow columns to the page with plenty of liberal panels at the side for special thoughts, well broken up with headings and with photographs put in occasionally in unusual places.

I have always thought that the matter of buying engravings should be entrusted to a printer. I have never been interested much in purchasing photo-engravings direct for house publications. Whenever I find myself puttering around with the measurement of an engraving or some such thing, I am conscious of the fact that I am putting my mind where it does not belong and not creating good ideas for my magazine.

I like photographs in a house-magazine. The reason I like photographs in a house-magazine is because everybody understands them so easily. But here I am conscious again of the fact that the photographs must show definite action and motion and that they should move the magazine definitely along the course for which it is intended.

Just to print a photograph of Hiram Johnson is all right as far as Hiram and his friends are concerned. But what puts the photograph over is what you say about it underneath the picture. You have got to create an idea around Hiram Johnson that will satisfactorily explain to your reader any reason for using the picture.

The last thing that I have been asked to touch upon is the matter of copy. To talk about copy for a house-magazine, I will simply have to go back to the beginning and say what I said all over again. Get positive, definite, moving words and thoughts into your copy. If you want a good course in writing copy and heading the latter which are about 90 per cent of the copy in a house-magazine in my estimation, read back files of the *American Magazine*.

THE VALUE OF HEADLINES

If you are writing about the Safety Movement, it may be perfectly all right and in good taste to use "History of the Safety Movement" for a heading. The chances are, however, a lot of the boys in the factory will

be more interested in your story if you write a heading which starts, "Let's Keep the One-Legged Men off the Streets in Grassville." Let them make the obvious deduction.

Another thing—and here's where you are going to lose out with most of your directors—deal generously with the intensely active present in your industry and very gently with your past history. The back history means spent pay envelopes for most men in your industry. What is happening now and what will happen in the future is engaging the attention of most working men.

You have probably decided at the beginning that the principle purpose of a plant publication is to make your men like your organization.

The President of the company always says, "We like to consider the employees of the Brown Manufacturing Company as being all one great big family." These are always sweet words even though they are ambiguous. But you will not accomplish it, in my estimation, unless you make the men like their surroundings by making them like themselves. After making them like themselves, you can make them like the things they are doing and you can make them like the other fellows who are around who are doing somewhat the same thing.

When you are charting a course for your house-magazine which is to accomplish these things, do not forget that your men are spending eight hours a day in your factory, eight hours sleeping (sometimes) and eight hours doing some other things. And your job has got to go a little farther than being entirely shop talk.

If you will pardon a second reference, don't be afraid to run a department under the slogan, "Do you Want to Buy, Sell or Rent a House?", or a health coupon by which you can check up on your weight, diet, etc., to see if you are eating the kind of food your job warrants—or still again an article on "The Wife in Business." As does the *Kodak Magazine*.

SECURE CO-OPERATION

The most interesting house-magazine that I know of is one of only about 16 or 18 pages and I think it has 16 or 18 editors. The man who edits this house-magazine is a sales manager at the same time. He simply has the faculty of getting 16 or 18 people to work on getting the news of his organization and bringing it in. He does not restrict them on the amount of news that they bring in either. He has a complete file for each editor. They all stand in a row. The editors are supposed to turn in about three times as much stuff as is finally used. From this material he makes the book. The editor of each department is given credit for the department. It is written over his name. Mistakes in English do not worry this editor very much. But when he gets through he has a vital, moving, live copy about his industry and the men who are in the business are getting the news because they are part of the news.

He does not spend a great deal of time on typography. He cleared the matter up the first month by insisting that his printer have one man handle the job. A printing salesman is one of the ex-officio editors of this publication and he is supposed to be on the look-out for ideas along

that line particularly. Somehow there is a free and breezy atmosphere about this magazine that does not exist among most plant publications. It may lack something in its artistic appearance. There may be comparatively little of scholarly effort in the copy—although some of it, I think, is pure gold. It does not look like the boss' handiwork because it is not. When the boss does put something into this publication, he puts it in over his own signature and everybody knows that the boss said it and the boss means it. Occasionally, this publication quotes from Elbert Hubbard, Emerson, or Shakespeare. But the times are few and far between. It is more apt to take its philosophy from the workers. It has made this corporation popular with its people because it has made them popular with themselves. It has gone all of the way. Its course is charted. Its compasses are set. Its sails are up. It travels.

GETTING THE MOST OUT OF ILLUSTRATIONS

FRANK E. REDMOND, OF THE STAFF OF ASSOCIATED INDUSTRIES OF NEW YORK STATE, INCORPORATED, BUFFALO, N. Y.

I shall precede anything I have to say on this subject, with the oft-repeated and, by no means original statement, "one picture will tell a story better than a page of type." I am a strong advocate of illustrations in a plant magazine. That is one conclusion I have had no difficulty in reaching from my own experience as a plant magazine editor.

When you have decided that pictures are to play an important part in the makeup of your paper, you must then consider the following:

- (a) How many shall I use?
- (b) What kind of pictures?
- (c) Where shall I get them?
- (d) How shall they be displayed?
- (e) What screen cut will give the best results?

How Many Shall I use?—Don't use too many. Effective display of a few good pictures is far better than the lavish use of a large number of mediocre ones. I should say about one photo for each page of your magazine is about the right proportion.

What Kind of Pictures?—Use any kind of pictures that will interest the greatest number of employees. There are several old standbys; you will undoubtedly find them old friends of yours and, perhaps, you will think I am telling you nothing new when I enumerate them. But these have stood the test of time. You cannot go wrong with them. I refer to children's photos—the children of your employees. It's a sure-fire feature and once started, should be kept up indefinitely. You will feel, after a few months, that it is getting to be stereotyped matter, but just remember that it is always new to the fond parents whose children's faces appear. And don't forget to use occasionally, photos of officials' children. Run them with the others. Make no attempt to give them special display.

Then, there are the old shop groups; photos of departments made ten and twenty years ago. Some of the men are still in your employ. Once you have made your wants known you will be surprised to see the number of these old photos that are brought in to you. It is the best kind of propaganda. They speak a lesson that sinks home to every worker in the plant—especially the newer men. They are bound to leave the impression with these fellows that this is a pretty good place to work. If not, "why are there so many who have stayed so long?" Do the same with individual pictures of old employees, using two photos if possible, one when he came to work and one at the present day. Use a short biography and let the employee who is the subject of the sketch tell, in his own words, just why he has stayed so long with the company.

Then, there are pictures of plant outings, of department entertainments, of ball games, of safety meetings and of fishing parties and the catch; your subjects are unlimited. If your experience is the same as mine has been, you will never be short of good pictures. Rather, you will find it a problem to select *the ones you should run* and diplomatically eliminate the rest.

How are you going to turn down a picture that is brought in by an employee, you ask, and have that employee depart without feeling that his contribution is being discriminated against? I know that is a problem, but I always made a rule that a picture, unless it had an unusual interest, must be clear and sharp, suitable for the very best reproduction. There you have your excuse. If you don't want to use a certain photo, explain that it will not make a good cut. Say that the engraver demands good copy. You "are sorry," etc., you "would be glad to use it if the photo was clearer."

USE OF ILLUSTRATIONS

I should like to emphasize that one point. Use only those pictures which are clear-cut and will reproduce well. Every photo loses something in engraving and printing. The poorer it is the greater the loss. A poor picture spoils the appearance of your page.

Where Shall I Get Them?—I should strongly advise every editor of a plant magazine to secure and learn to operate a good camera. I do not mean that you must buy the most expensive camera on the market and take a special course in photography. There are half a dozen cameras of reasonable cost that are easily learned and produce very satisfactory work. A good many editors think that buying a camera means that they must have a Graflex, because of the great flexibility of that type of machine. It is not necessary. For 12 years I was a newspaper man and during that time I had my choice of five or six, including a Graflex and other types of reflecting cameras, but my favorite for general work was a small Ica camera of the folding type, equipped with an anastigmatic lens of f4.5 speed and a shutter operating at 3/100 seconds maximum speed. We used to call it the "guess box" because you had to guess your distance from the subject within a foot or so or the picture would be out of focus. I covered every type of story with that camera and seldom failed to get

good pictures. I never used the Graflex except when covering automobile and horse races and other events where extreme shutter speed was necessary.

I should say that an ordinary 3-A Eastman Kodak, equipped with an Optimo shutter working up to 1/300 of a second and an anastigmat lens working at f6.2 or f7.7 will meet every emergency. The Kodak and lens should cost you about \$25; the shutter will add a little to the cost.

With this outfit and a little practice in studying light values and speeds, you are equipped to illustrate any event that may come to your notice. Have your prints made on a glossy surface paper, the degree of detail depending on the grade of engraving you use. If you are using a coarse screen cut, have your photographic prints emphasize the contrasts; if you use a finer screen, have prints made on a little softer paper in which the details are more prominent.

A camera is your one big bet if you would have the sort of pictures you want. With it you are able to stage any special photographs you may wish; you can attend all outings and bring back a picture record; its usefulness will be emphasized every day.

Other pictures, (portraits, etc.) may be secured, of course, through the usual appeals in the columns of your magazine.

How Should They Be Displayed?—Unless a picture is well displayed, it will lose most of its value. Consider the location of your picture on the page before you have a cut made. Plan your entire page and build it around the picture for the picture is the first thing that is going to attract the eye of the reader. Strike a happy medium for a size, but by all means don't try to economize by making your picture too small. Make the cut large enough to give full value to the picture.

Don't locate your pictures all in one place. Scatter them throughout the pages. Use an occasional layout, however, when the subject warrants it, the most effective type of layout being a combination line and half-tone; that is, a pen and ink border in which the half-tone is inserted. When a photo is not to be returned, effective layout can be obtained by trimming the photos to the desired shape and arranging them on a grey or figured cardboard on which the art work is carried out. Such a layout is reproduced only in half-tone.

CUT LAYOUT

Lay out your cuts in a tasteful manner. Many magazines are spoiled in appearance through a haphazard dropping in of cuts wherever there seems to be space for them. Overcome this by laying out your pages in advance. The appearance of your magazine is second in importance only to the content matter.

What Screen Cut Will Give Best Results?—The appearance of many plant publications is spoiled because the proper screen cut is not used. It is just as bad to use a coarse screen on an enameled paper as it is to use a fine screen on newsprint; yet both of these mistakes are often made. A coarse screen can be made on zinc and is, therefore, cheaper in price but this is foolish economy.

If your budget allows, use the best grade of enameled paper with copper cuts of 150 line screen or finer. If you must use a cheaper grade of paper, choose the right screen for it. If you use newsprint, don't attempt to use anything finer than 85 lines; more often a 65 line screen will give better results. On machine finished paper use 100 line cuts. Any of these can be made of zinc and should give good results. When you reach the finer grades of paper, however, consult the engraver. Cuts of 120 and 133 lines on copper are well adapted for use on medium grades of book paper and are the most generally used. However, if you are using a fine enameled paper, have your cuts made 150 lines. Few engravers carry screens finer than this, but if you would go deeper into the art of printing, you can use cuts with a screen as fine as 300 and 400 lines to the inch. The results obtained from such plates, however, depend almost entirely on the skill of the printer and often necessitate halts in the press run while the plates are washed.

I stress this point of the selection of the right screen for engravings because I see so many publications in which little attention has been paid to it.

Now just a word about the use of cartoons. This type of illustration is either the salvation or the damnation of your magazine. If you will have it the salvation of your paper, use judgment in how you use them. If you will have it the damnation of your paper, use every crude sketch that is submitted to you and you will soon have plenty of trouble to keep your mind busy. Plenty of cartoons, of the right kind, liven up your paper; they add the humorous touch which is absolutely necessary to the success of your publication. Cartoons of the wrong type stir up a nest of trouble that will stick with you until you finally write your "swan song."

So you have a problem. If you let it be known that you want cartoons, every would-be cartoonist in the plant starts showering you with crude examples of illustrated humor and you will find that the majority are directed at some unfortunate individual in the personnel. They are usually of a derisive type and show, more than anything else, the raw sense of humor of the average worker. You don't print such a cartoon but if you turn it down, the aspiring artist turns into a most energetic knocker against the magazine and its editor. If you do print it, the poor fellow who is the object of the thinly veiled insult does the knocking, so you are "between the devil and the deep blue sea."

What is the Value of a Cartoon?—In your plant, however, if it is of any size, you will find at least one man who is more or less skillful with the pen. Make him the official cartoonist of your paper and carry his name as such on the mast head. Then guide him; select your own subjects and have him put them in cartoon form. Other would-be artists will soon learn that this man is the official artist and that it is useless to send in examples of their own work. The result is that you will have cartoons uniform in appearance instead of a mass of crude sketches which only give a mussy appearance to your pages and add nothing of value to your magazine.

CARTOONS

Make it a practice to have several of these cartoons in each issue. If a humorous article is to be run, have it illustrated by cartoon sketches; sometimes just a tail piece will do, but it will add to the effectiveness of the whole. Cartoons are useful too, in putting over your safety and thrift messages. Straight safety or thrift propaganda, which runs the risk of being recognized as propaganda, may often be so camouflaged by the use of a cartoon that it rises from the ranks of propaganda to an interesting feature. As such it is doubly effective.

If you have no acceptable artist in your plant, have the work done by a professional. Just bear in mind that every individual is more or less an art critic. I have heard criticism of art technique come from the lips of men whom you would least suspect of having a sense of art values. Well-drawn cartoons, therefore, should be your aim. Don't use the crude offerings of the rank amateur. There is still another reason; the professional artist or even the amateur of fair ability, has studied line value. He knows that fine, grey lines in the drawing will not reproduce. He knows that he must use bold, black strokes. The drawing made up of scratchy lines is but a mussy blotch when printed.

The cover page, I think, comes within the subject of this paper. If you would get the most out of it, you should select the cover illustration with great care. If it is a photograph, be sure it is a good one and will reproduce well. If it is a cartoon, make sure it carries a general interest. The subject of the cover illustration influences the mind of your reader toward the contents of the magazine. If he is pleased with the cover, he opens the pages with a feeling that he will find therein something else just as pleasing. If he dislikes the cover, he throws the magazine aside or scans through the pages without particular interest.

What Kind of Cover Should One Use?—When I was editing a plant magazine I gave this one matter the deepest thought and, after much discussion with the departmental editors and the editorial board—made up of executives in that instance, it was decided that the cartoon cover would be the most effective. Perhaps the fact that I had spent a number of weary years as a newspaper cartoonist, influenced the decision, but it is a fact that the cartoon cover jumped into immediate favor with the men in the plant. Each month we produced a little cover sketch which emphasized play rather than work; which had a general appeal to all classes; which never suggested, even, that the magazine was a plant publication. It carried the appearance, rather, of a magazine of fun and we had expressions enough from all parts of the works to convince us that the men were looking forward with pleasure to each issue, often just to see what we had on the front cover. It was evident to us that, with this attitude, the men were opening the magazine with interest; an interest that would carry through each page of each issue.

I am not advocating this type of cover as the ideal magazine cover. I am merely citing the facts of my own experience. The scenic cover may appeal to your particular class of employees; or the decorative cover, or the symbolic. I can speak only from my own experience.

If you can afford colors, by all means use them. Bright colors, especially, are pleasing to the workers of Latin type. If you have many foreign-born workers in your plant, a color combination—especially on the cover of your magazine—is worth while. If you have a standard front cover, change the color combination each month. The magazine is thus always new in appearance. Men tire of the same cover repeated from month to month. Strive to give them something new and striking. They will take a greater interest in your publication.

In closing permit me to call your attention to Hackleman's "Commercial Engraving and Printing," published by the Commercial Engraving Publishing Company, Indianapolis. It is a most complete manual of practical instruction covering all phases of the printing and engraving art, clothed in a language that is wholly intelligible to the novice. I recommend it to every editor of a plant publication.

OUR EMPLOYEES PUBLICATION AND WHAT IT HAS ACCOMPLISHED

SPENCER HORD, EDITOR, *The Kodak Magazine*, EASTMAN KODAK COMPANY, ROCHESTER, N. Y.

I cannot say that *The Kodak Magazine* has reduced labor turnover so many per cent, that it has reduced absence and tardiness so many degrees, nor that it has induced a certain number of employees to invest their savings in the EASTMAN SAVINGS and LOAN ASSOCIATION. Nor can I state that it has reduced accidents by so many cases, that it has bettered the health of such a certain number of employees. But I can say that it has been a decided factor in accomplishing all of these things.

The Kodak Magazine is now in its fourth year, and is conducted as part of the work of our industrial relations department. The magazine came into being shortly after the formation of the department because it was felt that an employees' magazine, rightly conducted, would prove of value in promoting work of the department.

As to the planning of the magazine and the formation of its policy, my instructions were decidedly brief. One of our vice-presidents with whom I have had the pleasure of close association for a good many years, notified me of the new job. He said:

"You have been selected for the job not because you can sling words together, but because we happen to know that you have made more than the usual average of human mistakes, and so we have a slight hope that now in your mature years you may be able to help your fellow-employees to avoid similar ones."

Outlining a definite policy presented no difficulties because I knew from long association just how the heads of our organization stood as regards the employees, and I knew that I could be assured of hearty co-operation from all the executives from Mr. Eastman down.

MUST SELL COMPANIES TO EMPLOYEES

The purpose of any employees publication is primarily to sell the organization to the employees, to convince them that the organization

is a good one with which to be connected, and to prove to them that they will in every case be handed a square deal in all relations with the company.

The employee knows that every first-class business organization is interested in him as an individual as well as one of a class. If he does not know that, it must be proved to him and for this there is no better way than through the columns of the plant publication.

This being the policy of *The Kodak Magazine*, what had it to sell?

This being a meeting of the National Safety Council it seems fitting to start with the part our magazine plays in general safety and accident prevention work. We feel we have a very efficient safety organization headed by Major Charles H. Thompson as general safety supervisor. In every issue of *The Kodak Magazine* we print a tabulated accident report for the month preceding covering all Rochester plants. We do not print a special safety page, but in addition to the tabulated report, practically every issue contains a story covering some phase of fire or accident prevention. The safety problem is kept ever before our employees, and we have every reason to believe that our magazine has been a factor in reducing our accident percentage.

Safety articles in *The Kodak Magazine* are supplemented by safety bulletins, many of which are those supplied by the National Safety Council.

In close relation with the work of our safety organization is that of our medical department. This is quite elaborate and functions in different ways which need not be mentioned in detail here. It has been the aim of *The Kodak Magazine* to sell the work of the medical department to the employees, to impress upon them the necessity for the prompt, and proper, first-aid treatment of even the smallest injuries such as scratches and abrasions, and to emphasize in all ways proper guarding of their health. We have published many articles on health topics, including correct diet, the care of the teeth, seasonal disorders, and kindred topics.

It has been our endeavor to protect our people from the unscrupulous fakers in medicine, not only the practitioner, but the purveyors of patent nostrums as well. We have made it easier for our visiting nurse to gain access to the homes of our employees who are ill, and to establish friendly relations with them, through articles in the magazine telling of their work. Our people regard the medical department in a very friendly light and I cannot help but believe that our employees' publication has been a factor in bringing about this much-to-be-desired feeling.

In common with most larger organizations we have a legal department. The services of this department are available to all employees for consultation regarding any personal legal matters.

TEACHES FAITH BY PROPER INVESTMENT GUIDANCE

New York State has been a fertile field for the promoters of fake stock propositions, and salesmen have taken a heavy toll from the working people of Rochester. *The Kodak Magazine* has repeatedly called attention

to the activities of these "pests," and has been instrumental in having our people consult with our legal department before parting with their savings which, before these warnings, was all too frequently the case.

Under our stock distribution plan all employees, after a certain period of service, are permitted to purchase common stock of the company. A great many of our employees have completed payments on their shares which will become their absolute property in July, 1924, and many others will have their shares delivered to them each year thereafter. In practically all cases his stock has not cost the employees a penny because the shares were sold to them at par, and accruing dividends credited on their shares have paid for them.

This stock is very valuable and is given to the employees as a reward for faithful service and as a basis for establishing a competence in old age. Many vultures have had their eyes on this stock, and schemes galore have been formulated to get hold of it. Our employees' publication has been instrumental in teaching our people the value of this stock, and will continue to expose all schemes for despoining them of their stock.

An annual wage dividend also is paid to all employees after a certain period of service, and *The Kodak Magazine* has endeavored to point the way to the saving or investment of this extra money.

The Kodak Magazine has, without question, been of much benefit in promoting the purchase of shares in the Eastman Savings and Loan Association, and the financing of homes by employees, and in intelligent selection and purchase.

The Kodak Magazine has familiarized our employees with company history and with its various factories and branches, both at home and abroad. It has fostered social activities between the various plants, has promoted athletic activities, the study of amateur photography, the reading of good books, and many other things that have to do with the happiness and welfare of our employees.

MAGAZINE ANSWERS QUESTIONS FOR EMPLOYEES

Our company was one of the pioneers in establishing suggestion systems and in paying substantial cash awards for ideas. These systems are in operation in all of our plants, and *The Kodak Magazine* has published many articles stimulating interest in this direction.

As I stated in the beginning, it is the policy of the company to lay all its cards on the tables. When a wage reduction became imperative in some of our plants in 1921 we took the employees into our confidence by telling them, through the magazine, just why this step had to be taken.

We have, on occasion, replied to anonymous letters to Mr. Eastman, our president, when it was felt that the writer had the wrong idea as to our square-deal policy, and had the right to have his letter answered.

In a late issue we commented on anonymous letters as follows:

"Once in a while, not very often we are thankful to say some executive of the company receives an unsigned letter from an employee.

"Such letters are usually expressing dissatisfaction with some condition, or conditions, relating to employment.

"In practically every case, this dissatisfaction comes through some misunderstanding which could be cleared up if the writer would disclose his identity.

"From top to bottom, the policy of the Eastman Kodak Company is the square deal for every one, and as far as is humanly possible, this policy is being carried out.

"It is quite possible that, for some reason, the writers of these letters do not wish to take up the matters, at issue, with their foreman or department head; this is of course, an error but quite a common one.

"In view of this, we invite the writers of these letters, and any others of our employees, who feel that they are in the same boat, to get in touch with our industrial relations department, State Street office.

"It goes without saying that you will be met with courtesy, and every effort made to arrive at a full understanding. A personal call would be preferable; if this is not convenient, write a letter—but give your name and address so that we may know with whom we are dealing."

The planning and editing of *The Kodak Magazine* has been a real pleasure because I have had whole-hearted co-operation from every executive, and enthusiastic support from all plant editors and reporters.

OUR PLANT PAPER AND WHAT IT HAS ACCOMPLISHED

H. R. ZIMMERMAN, EDITOR, *The N. C. R. News*, NATIONAL CASH REGISTER COMPANY

Being asked what a plant paper accomplishes, I want to tell you what we sincerely believe our paper has done. In any of these remarks, I think you will recognize the same things that your own papers have accomplished, and it will be nothing more nor less than a confirmation.

The N. C. R. News and what it does for the employee:

Keeps him reminded of his opportunities and that promotions are made from the ranks, because every issue carries a picture or two of men who have been promoted.

Gives him information about the business which he could obtain in no other way.

Makes him realize that he is part of an organization which is world-wide in scope.

You will perceive we stress the educational side of it, because of the fact that of 1,700 men in the field, approximately 500 of those men have come through the factory, and we are continually trying to get our men stimulated to the point of going out into the field. That is the reason we try to stress the educational side. We try to use drama, cartoons, and every other human element to get it across.

It wipes out misunderstanding between management and men and humanizes the management.

It provides a medium through which the worker may express himself.

Mr. Young talked upon that point very effectively, about these nuggets of gold that the men have. I go out into the factory and find that I am not the only fellow that thinks. Those fellows with the old clothes on can think some, too.

Protects the worker by driving home the value of thrift, safety, health.

Answers questions which the family naturally wants to know about the business upon which their prosperity depends.

Awakens a desire in the children to become employees of the National Cash Register Company when they grow up.

Our Children's Readings especially do that; on Saturday morning, we have about 3,000 children at the readings.

It makes the women in the home realize their tremendous influence as silent partners in the business.

It creates confidence in the future prosperity of the company, and gives them a feeling of security in their own plans.

Gives practical suggestions for home improvements.

Factory News was started in 1892, a little paper which was intended to keep alive that personal contact between Mr. Paterson and the men, the same as in the beginning when he had thirteen employees. The only difference between *Factory News* and the *N. C. R. News* is that the latter is edited by the employees and has a little higher percentage of human interest material in it. Fundamentally it is the same.

It promotes friendly rivalry between departments and thereby reduces waste, prevents accidents and increases production.

It brings capable men to the attention of the management who, by writing good articles, prove that they can think and express themselves.

It attracts skilled labor by pictures and articles showing the ideal working conditions that exist throughout the factory. We have many cases of men coming to our organization who come through the *N. C. R. News*, and if they are good men and skilled, we both profit.

It maintains to a large degree the personal relationship that existed with the late John H. Paterson and the thirteen men who started with him.

It helps other companies to solve their problems by showing them how we solve ours.

It teaches that it pays for an industry to take an active interest in civic affairs and social conditions generally.

An Employees' Magazine is one of the best indirect publicity mediums an organization can have. It is a most effective piece of background advertising.

It gives the employees a more intimate acquaintance with their executives and results in a freer exchange of ideas.

It impresses the public with the fact that where working conditions are right, the product can be depended upon to be right.

It gives prospective workers in schools and colleges practical insight into factory life. No doubt a number of you people have colleges and schools on your exchange list, and they use our publications as textbooks in their classes.

It creates great interest in civic affairs.

It gives authentic information about the business and the policies of the company.

It emphasizes that the true source of human welfare is work, and that it takes more than wages to win the cooperation of men.

ADJOURNMENT.

Public Safety Section

October 2, 3, 4, 1923

DAVID VAN SCHAAK, Chairman

Aetna Life Insurance Company, Hartford, Conn.

D. E. PARSONS, Vice-Chairman

East St. Louis and Suburban Railway, East St. Louis, Ill.

R. B. STOECKEL, Vice-Chairman

Commissioner of Motor Vehicles, Hartford, Conn.

A. H. LINTZ, Secretary

Manager, Cleveland Safety Council, Cleveland, Ohio

TUESDAY AFTERNOON SESSION

CHAIRMAN VAN SCHAAK: There has been nothing in the developments of the past year, nor is there anything in consideration of the future possibilities of safety work which would lead now to the belief that the Public Safety Section is on the wrong track. On the contrary, everything points to the development of the outstanding activities of the year and an increased interest in them as the most dependable means in the light of experience of furthering the objects of the National Safety Council in its public safety activities.

What is most needed to give public safety its right place is to arouse public sentiment to an appreciation of the seriousness of public hazards and of the necessity of developing practical means of coping with them. This appreciation has been slow in developing, but there has been notable progress during the past year, as evidenced by the increase in the number of chartered local councils, and especially the increase in the number of those with full time paid secretaries. At the end of the fiscal year, there were 51 chartered locals in comparison with 34 at the beginning; and there were 30 locals with full time paid secretaries as compared with 18 at the beginning. Of these 12 new locals with full time paid secretaries, all but two of them were developed through the activities of the National Safety Council; six of them as the result of field work in "virgin soil"; and three of them as the result of field work in communities where organization had been attempted. This extension of the local council movement is of great promise. There can be no better evidence of a community's interest in public safety work than its organization of itself for this purpose.

Another notable development of the past year has been the increased interest in public safety shown by the newspapers, especially in connection with traffic accidents. A big opportunity in public safety work today lies with the newspapers of the nation. They are already performing a most significant service in keeping causes and results of public accidents continually before the public. This service may well be enlarged to include a program of education directed at the great reading public to teach the principles of safe driving and safe walking; to explain street and public safeguards of mechanical or regulatory nature; and to keep the need for more public safety continually before us as a nation.

MORE NEWSPAPER PUBLICITY NEEDED

More newspaper publicity on automobile accidents is greatly needed to stem the heedless and reckless conduct of 10 percent of our motorists. Some newspapers are chronicling the growing toll in automobile accidents by the "clock method" or by showing the daily death record in black face type blocked in so as to attract notice. Such ideas are worthy of imitation, for they arrest the attention of a newspaper's readers and have more or less of the pictorial effect. An automobile accident is not only news; it is a community calamity of the greatest importance—another human life needlessly wasted. More stringent enforcement of laws lies within the realm of the newspaper as watchdog of the public interests.

Some of the newspapers of our larger cities, which from day to day have given the reading public the detailed facts of fatal and less serious automobile accidents in such a way as to carry between the lines a warning against recklessness and indifference have, I am certain, accomplished a great public work in their respective communities. There is no doubt of the power of the press in moulding public opinion, and it follows that in communities where the press has exerted its powerful influence against avoidable accidents, public opinion is aroused against them also. Newspapers, automobile clubs, and national associations correlated with this kind of work should cooperate everywhere to minimize the accidents caused by our rapidly increasing motor traffic.

Of course, public sentiment, even fully aroused, must work along the right lines to accomplish real results in public accident prevention, and especially the prevention of automobile accidents. It is highly essential, therefore, that uniform and accurate accident statistics be developed to show exactly where, when, how, and why accidents occur, so that prompt and definite measures may be taken to eliminate the causes so far as possible. I think this Public Safety Section is to be congratulated upon the excellent work in this direction done by Dr. Dublin's committee.

One of the outstanding developments of the year in the direction of public safety has been the organization of the conference of Motor Vehicle Administrators of the Middle Western States. This is the second of such regional conferences to be organized, the first having been the Conference of the Administrators of the Eastern States; and it is sincerely to be hoped that this conference movement will extend to other sections of the country, as the South and the Far West, and that eventually these

conferences will lead to the development of national uniformity in motor vehicle laws and their administration, so far, at least, as safety is concerned. While the motor vehicle laws of the several states will necessarily vary in many respects, they can certainly be uniform so far as the principal general requirements of safety as well as convenience for motorists are concerned. There is no single influence in any state so powerful in the promotion of motor safety as that of the state's motor vehicle department which, given the proper authority to control operators' licenses can not only be of tremendous assistance to community effort but can further the cause of safety in a state-wide manner which is impossible through the organization of communities.

TRAFFIC SIGNAL WORK

Another important development of the year in which the Council through this section has been concerned is the work of preparing a code on colors for traffic signals. Three sub-committees have been engaged in the preparatory stages of this work for some months and will be ready next month to report to the executive committee in charge. One of these sub-committees has collected information, studied the experience with all colored signals now in use as traffic signals, and, where possible, has ascertained the reasons for adopting certain colors for specific uses; has studied the use of colors in railroad and navigation practice; and has studied the present traffic methods of signaling, including the use of various types of semaphores, flashing signs, etc. Another of these sub-committees has studied the relative visibility of colored lights now in use such as the standard railroad signals, with various backgrounds and various conditions of atmosphere (dust, fog and smoke). The third sub-committee has studied non-luminous signs and signals with the purpose of suggesting appropriate colors, shapes or other combinations for highways, to be used at all situations coming up in practice, including railroad crossings. This brief outline of the work assigned to these sub-committees will indicate that each of them had a large job on its hands, one which required ample time in order that it might be properly done.

The executive committee which is to receive the report of these sub-committees is composed of a representative from each of the following groups:

- Associations and officials having administrative authority
- Owners and operators of automobiles
- Manufacturers of automobiles
- Manufacturers of automobile accessories, signals and signs
- Railroads and Interstate Commission
- Insurance
- Scientific and technical societies.

This representation assures consideration from every possible viewpoint of the information furnished and recommendations made by the sub-committees, so that when the sectional committee is called together to

finally act upon the proposed code; it should have before it a carefully thought out and developed plan for regulating the use of colors for traffic signals.

I cannot close these brief and inadequate remarks without at least reference to the work for public safety which is being done by the Education Section of the Council. The reports and addresses at the meetings of that section will show that even with the limited facilities at its disposal a great deal has been done during the past year to make proper consideration of safety a real factor in the education of the coming generation of adults.

There are many features of the Council's public safety work during the past year upon which I shall not even touch. Through the Public Safety Division at the headquarters in Chicago, the section has endeavored to stimulate interest in all phases of public safety, and to follow up encouragement by such practical assistance as may have been possible. It seems to me that the work of the coming year should start at least along the lines followed for some time past. We cannot flatter ourselves that we have found the "cure-all" for public hazards; it probably never will be found. But I think it is safe to say that the Council's encouragement of community organization, and of newspaper publicity and campaigns for public accidents have demonstrated their practical value. If, with public sentiment aroused by these means, the Council can increasingly promote the development of better accident statistics, and through cooperation in research and in the development of practical remedies can help in guiding this public sentiment along the right lines, it will make a worth while contribution to the welfare of this country.

REPORT OF SECRETARY

A. H. LINTZ

I think there are three essential things the Public Safety Division should drive home during the coming year, namely, the operators' license law, more rigid and stricter law enforcement and permanent or part time safety supervisors in our public and parochial schools.

REPORT OF ELEVATOR HAZARDS COMMITTEE

J. G. SHAW, CHAIRMAN (READ BY MR. VAN SCHAAACK)

To this committee was assigned the work of preparing a series of stereopticon pictures accompanied by a descriptive talk on the various subjects shown. Also short talks for use in Radio Broadcasting, or direct to an audience, impressing upon those using elevators the necessity of exercising care when entering or leaving the cars. Consideration was given to the matter of suitable pictures for bulletin display, but although the committee has on hand quite a number of photographs for this purpose, these have not been worked up for actual use and we would be glad to submit same to the next committee if they care to make use of them.

The activities of the present committee have been directed principally to the education of the public and as to how it may travel on elevators

with safety to themselves and others. There is no question but that the lack of care on the part of some of those who are injured or killed is largely attributable to their own thoughtlessness or recklessness. In this respect they share responsibility with the car operator if he is of the indifferent or careless kind, and are a menace to those who are inclined to be careful.

The Committee which preceded the present one dealt very thoroughly with the operators of elevator cars, by means of a series of lessons designed for their instruction. To each lesson was appended a questionnaire to test the student's retentive memory on the subject and to bring out the knowledge acquired of the various parts which enter into the proper operation of the complete elevator.

Elevator accidents originate from different causes but there is no doubt that the large majority are due to carelessness either on the part of the operator or the injured person. It is true that some accidents are due to poor construction and inadequate protection at the shaftway entrances, lack of proper upkeep maintenance and also lack of proper inspection. But where periodical inspections are made by state, municipal, insurance or other qualified inspectors, elevators are fairly well maintained and taken care of. It is usual for a person reading about an elevator accident to assume that the cables supporting the elevator must have broken, thereby precipitating the car to the bottom of the hoistway, but such cases are remarkably few considering the number of elevators in use, and the new types of machines of modern installation are likely to proportionately reduce the number of accidents.

The secretary of this committee has on file some statistics from various Middle and Eastern States which, upon analysis, bear out the foregoing statement, showing that the very large percentage of accidents occur at the shaftway doors, and this condition seems to hold true regardless of vicinity or location.

I think it is the opinion of your committee that there is still opportunity for improvement in the safety of elevators and that there must be some positive means provided to prevent the movement of elevator cars while at the floor landings until after the shaftway doors and the car gates have actually been closed and locked.

At the present time several bodies of men well qualified to devise and create rules bearing on the construction and safe operation of elevators are at work, and when they have completed their labors, there should be in existence something worth while, and to which I have no doubt the National Safety Council will lend countenance.

(Motion made, seconded and carried that the report be accepted.)

APPOINTMENT OF NOMINATING COMMITTEE

Chairman Van Schaack: It is the duty of the chair at this time to appoint a nominating committee. I will ask Mr. C. M. Anderson to act as chairman, and with him Mr. A. H. Lintz and Mr. J. H. Goldie, and I suggest that the committee have its report at the opening of the session tomorrow afternoon.

The first address on the program this afternoon was to have been given by the Honorable Barron Collier, of New York City. Mr. Collier found it impossible to come and asked Mr. Dow, executive secretary of his department, to give the talk. It is unnecessary to introduce Mr. Dow to the National Safety Council.

PUBLIC SAFETY WORK BY THE POLICE DEPARTMENT IN THE GREATEST CITY IN THE WORLD

MARCUS A. DOW, EXECUTIVE SECRETARY, BUREAU OF PUBLIC SAFETY, NEW YORK CITY POLICE DEPARTMENT

If there is any doubt in the minds of any one as to the very great necessity of a Bureau of Public Safety in the great City of New York let me tell you that last year 964 people were killed by moving vehicles in the streets of five burroughs of the city, and when you stop to consider the great amount of human suffering caused unnecessarily by preventable street accidents I think you can realize the situation that caused Police Commissioner Enright, one of our progressive public spirited citizens, to create within the Police Department of that city a Bureau of Public Safety.

He appointed as a special deputy commissioner, in charge of the work of this bureau, Mr. Barron Collier, one of the outstanding business men of the city, a wealthy citizen who is at the head of probably the largest advertising organization in the world.

It was Mr. Collier's idea from information that he had already received in regard to safety work that a combination of the principles of advertising with the authority of the Police Department in a great city like New York would bring forth the best kind of results in the reduction of street accidents.

The first step that was taken after this bureau had been organized was Mr. Collier's sending for me and asking me as a man who had had experience in safety work to come into his organization and represent him in the Bureau of Safety and assist him in putting on this experiment.

Let me say that Mr. Collier is himself, out of his own pocket, supporting financially the work of this bureau up to date. We hope next year to get some assistance from the city, because of the demonstration we have made of the practicability of the work and the results that can be accomplished.

The first work that was undertaken after the bureau was organized was to begin to make an analysis of the causes of street accidents. We got up what we called a precinct sheet, classifying all motor vehicles and highway accidents in the city under 21 specific headings, and separating them according to school districts, precincts and locations. We found some very remarkable circumstances in connection with street accidents as revealed by these statistics.

We found that in one month, the first that this record was kept, out of 45 persons killed on account of being struck by vehicles in the city streets, 35 per cent were struck by crossing streets away from the regular street crossing.

VISUALIZING CAUSES FOR ADVERTISING

We desired, from an advertising standpoint, to pick out the cause of accidents that we could visualize in a manner that would appeal not only to the adults but to the school children in some sort of advertising character, and so we hit on the subject of jay-walking and anti jay-walking, as the thing that should be developed in the minds of all people as a basis upon which we could develop our advertising for the public safety campaign.

The art department of Mr. Collier's organization created for us a character that we can use for a sort of safety advertising slogan. I will get down to this particular character and the use we have made of it a little later on.

After the work of compiling these statistics and analyzing the causes of accidents in the city had been started we selected from the great uniformed police force of the city of New York sixteen men of the rank of lieutenant who were assigned to us by the Police Commissioner and who are now devoting their entire time to the safety work of the Bureau of Public Safety. These men have been doing wonderful work in spreading the gospel of safety among chauffeurs and drivers, and particularly among school children.

For instance, during the spring months of the present year, they made a special drive in the garages throughout the city, appearing there in uniform and in a heart-to-heart and man-to-man sort of way conveying concrete and definite safety instructions and messages to the drivers of motor vehicles in the city.

In New York with our six million inhabitants and 315,000 registered motor vehicles within the city it is a difficult proposition to try to organize drivers' schools that would be anything but a mere drop in the bucket among the great number of registered chauffeurs and drivers in that city, but we have been able with this force of trained lieutenants who have been trained to talk on the subject of safety to go into the garages at any time that might be convenient to the owner or proprietor of that garage, sometimes as early as six o'clock in the morning, and get together fifteen, twenty-five or a hundred chauffeurs before they go out on their day's work and give them a half hour's lesson on safety. These men have conducted several hundred of these meetings in garages during the spring months of the year and conveyed their message to approximately 30,000 chauffeurs and drivers in that period.

Then we took up the subject of going into the public schools. We trained the lieutenants of public safety especially along the lines of conveying the message to the children in language that would appeal to that type of an audience. We got the cooperation of the Board of Education, of course, without any difficulty whatever. The lieutenants then went to the public schools and, arranging through the district superintendents and principals, held large, and are still holding, large assembly meetings for the children in the public schools throughout the city.

Up to date (we started this work in May and had to discontinue it during the vacation period) the lieutenants have delivered a 20 minutes

safety lecture to approximately 300,000 children in the state of New York. We hope next year to have reached every one of the 1,250,000 school children in the greater city.

ARRESTS MADE FOR BRAKE DEFICIENCIES

We have taken up another feature of the safety work which seems to me one of the most important things we have done. There is no question in my mind from our experience that a great many of the accidents occurring in the city streets due to the use of motor vehicles might be prevented if the braking apparatus were always in the proper order. So we put out on the streets of the city what we call our brake inspection squad in charge of one of the lieutenants. These men work in pairs; they go out with a motorcycle with a side car into certain sections of the city and stop vehicles, get up on the seat and make a running test of the brakes.

If they find that one brake on the car is defective the driver of the car is given a ticket and required to come back within a period of three days to a designated garage, meet the inspection man and show that that defect has been corrected.

If both brakes on the car are defective under the provision of the Highway Act in the state of New York, which requires motor vehicles to be equipped with adequate braking power, the driver is given a summons to court.

Up to date that squad of ours has inspected 50,000 motor vehicles largely of the commercial vehicle type. Of that number they found 24 per cent of them with at least one brake on the car defective; 2,000 convictions of drivers who were operating cars on the streets with brakes that were so defective as to be an absolute menace to human life have been obtained. It seems to me, and I believe that you perhaps will agree, with me, that the man who will operate a motor vehicle on the congested streets of a great city with brakes that are a menace to human life is just as much a danger to the safety of humanity as the speed maniac, and should be dealt with accordingly.

Now, then, we are continuing this campaign against defective brakes. We also have out on the streets of the city another squad of uniformed men who are going about and marking the streets with lines that at the street crossing indicate the proper place for pedestrians to cross. An arrow is stenciled on the sidewalk at these corners pointing across the street for the proper place for the pedestrian to cross, with the words printed "Cross Carefully."

More than 10,000 street corners were stenciled during the summer in this manner. We also put out on the streets a special squad of men called accident investigators. Now, of course, every member of the uniformed force is expected to make a report to his superior officer, giving the details of any accident that has occurred. The great trouble, however, has been that a great many times these accidents occur when the patrolman is not on the ground. He gets there after it is all over; he

gets the names of witnesses, it is true, but finds that these witnesses refuse to give information. He therefore fills out the accident report card, and it shows very little that will be of value to the Bureau of Public Safety.

When a report of that kind comes in the lieutenant in charge of the district in which the accident occurs goes to the patrolman who made the report. If he feels that patrolman is in position to get further information he sends him back and instructs him as to the information he desires. If he feels it is a case that requires special investigation, it is given to one of the special investigators of the Bureau of Public Safety, who goes out and investigates that case the same as a detective would run down any criminal case.

APPEAL TO WITNESSES AS GOOD CITIZENS

He goes after the witnesses, and ascertains whether these witnesses have facts they are hiding; he appeals to them from the standpoint of good citizenship to come across with the information that will help us to make the streets of the city safer for human lives. We have found any number of cases where information had been withheld and where these men were able to help us to get convictions that would not have been procured in any other way.

That very briefly tells you of the work being done by the uniformed police force. Now, let me say something about this advertising part of our program. I have brought here two or three charts of the advertising placards that we got out on our jay-walking campaign. This little character is "Auntie Jay Walker" and this is the placard I referred to as being plastered all over the city. Nothing was shown that would give an idea of what it was intended to convey; it simply created curiosity on the part of the public; that was allowed to stay up for a period of five days and then we had twenty thousand boy scouts out on the city streets delivering into the hands of one million people a small card that gave the picture of Auntie Jay Walker and gave the message to the public.

We followed that up with other placards of similar nature. We created, during the last two months of the school period, what is called a safety hour. At three o'clock in the afternoon 1,250,000 school children in the 836 schools of the city were required to stand at attention for a period of one minute while the teacher gave them safety admonitions before they were discharged from school.

At the same hour, three o'clock, through an arrangement we made by sending out one hundred of the police officers to interview heads of manufacturing associations, etc., we got the factories to blow their whistles telling the city that the children were about to be dismissed from school and warning folks to be careful. The psychological effect was tremendous. This is a brief illustration of the character of the work being done by the Bureau of Public Safety, with the most expert advertising we can secure.

What has it accomplished? Let me say that during the first six months of 1923 as compared with last year, in spite of the fact that there were 45,000 more motor vehicles registered in the City of New York than the previous year, there were 852 fewer injuries.

Eight hundred and fifty-two children saved to live, grow to maturity and serve their fellowmen and their country as it was intended that they should live and serve! And I want to say to you that this sort of a campaign, the Police Department enforcing the law with all the authority of the city back of it, and with an advertising campaign that will appeal to the public, you can save human lives and get the best results, as I have stated, by going at it through the cooperation of the public schools and the drivers of the vehicles in the garages.

If there is none, we will proceed to the next address on our program.

We are privileged in having as the next speaker the Honorable Robbins B. Stoeckel, Commissioner of Motor Vehicles of the state of Connecticut, a man who has been a pioneer in bringing the attention of motor vehicle departments of states to coping with this public safety problem. Mr. Stoeckel.

REGULATING MOTOR VEHICLES AND PREVENTING ACCIDENTS

HON. ROBBINS B. STOECKEL, COMMISSIONER OF MOTOR VEHICLES, STATE OF
CONNECTICUT, HARTFORD, CONN.

The traffic problem of the United States, viewed from the safety angle can only be glimpsed in its entirety when it is thought of in the same light as any other great problem which affects the health and welfare of all people. There is a familiar analogy available.

History and experience show that the problem arising from any great epidemic of disease goes through several phases before it is conquered. First there is a single case, endangering a small number of individuals, a family perhaps and neighbors; then a group of cases endangering a community, and finally a spreading, virulent epidemic breaking out and destroying, no one knows when and where. In the first phase, no alarm is raised; in the second, there is a little apprehension but no fear. But in the final phase the people, in numbers large enough to constitute a public, become alarmed and apprehensive, the danger feeling spreads, everyone worries and, as a result, the urge for a remedy comes and corrective forces are called into being and set to work. Forthwith experiments begin, scientists search for specifics and the public exercises its common sense for self preservation.

So with danger in traffic. In the first phase, beginning with its advent, the automobile caused no alarm except a slight stir in its immediate environment. In the second, with moderate enlargement of numbers and consequent increase in opportunity for injuries, it began to bring fear into the group and community and finally, in the last phase, traffic danger has grown into a great spreading epidemic, the end of which is not yet.

Danger in traffic caused through automobiles always has as its cause either one of several elements, or a combination of elements. Of these elements, one or more are always present, others are usually present and still others are rare and unusual. One element always present is the

PERSONAL EQUATION

The direct use of an automobile is an expression of the personality of a man or woman. If he or she possesses characteristics of consideration for others and of caution and care, these will be expressed in driving. Again, if his or her character be dominated by selfishness, rudeness or recklessness, *those* will be expressed. This element is as wide spread as humanity itself and rings the change through all the degrees and divergences of character. The mechanical control of a car is simple. There are a few, if any, people who cannot learn it. The actual qualification of fitness to operate is one of mentality. Operation of a car is an expressed act of the mind. Therefore the first qualification must necessarily be *a good enough mind to drive*.

EXPERIENCE IN DRIVING

Granted a suitable mind and disposition, no man or woman can hope to become a driver without experience, but the degree of experience demanded as a *sine qua non* need not be great. It is self-evident that the danger point with a new driver will not come, mechanical control admitted, until he gets over being super-cautious—until he needs no longer to be careful about the co-ordination of his hand, foot and eye, and becomes self-confident. All drivers pass through this stage and the extremes, while in this frame of mind, are the most disagreeable and dangerous. Experience, it is strange to say but none the less true, causes hazards as well as prevents them, but only in combination with personality. How often a very expert driver with an excellent eye for distances will thoroughly alarm others who do not know he is so blest! The too-experienced driver with a grain of the quality of lack of consideration in his make-up causes more accidents and mishaps than any new and inexperienced driver. Experience is necessary. If taken as a teacher and not as an instrument for speed in traffic, it will fit a driver rapidly and well. Experience is also needed to anticipate the action of other drivers. Nothing will so soon teach a driver what to expect, as the unexpected.

THE ELEMENT OF HIGHWAY CONDITIONS

Now put a well-dispositioned and experienced man or woman into an automobile to drive along a highway and at once the element of the physical characteristic of the road asserts itself. Every road has hundreds—yes, thousands of traps which are all set. This is because it has never been and probably never will be possible to build an entirely safe road from a physical standpoint. The road building effort has been controlled by other than safety considerations. The needs of business transportation and, to some extent, scenic advantages have determined when, where and how a highway shall be built. There are also, in connection with the building of highways, many complicated engineering

problems, most of which have to be compromised, so there are short curves, steep and slippery hills, underpasses and grade crossings in large numbers. Past construction for durability has made the high center, low shoulder road the common form. The tendency of this road is to turn a car off because its grades are not adapted to straight driving.

CAR EQUIPMENT

The element of our equipment enters into every hazard, but again in combination only. Brakes, springs, steering wheels, signals, must all on all occasions be serviceable enough to command approximate perfection in starting, running and stopping, but again the original quality of mind enters in. The good mind adapts itself to its equipment almost without conscious effort, so that a wide latitude is possible. As a factor for danger, poor, run down and imperfect equipment looms large, but ordinarily such defects must be extreme to be dangerous. In short, a good mind with poor brakes is better than a poor mind with good brakes.

OTHER ELEMENTS

There are many other elements which are found to contribute to danger. Included among them are some which are fundamental and others which are spectacular. It is perhaps only natural that the spectacular ones first call for remedial measures. Among the most prominent of these other elements are speed, bad passing from the rear in bad locations, bad sight lines, and lack of caution in passing street cars; in equipment—poor lights, including bad use of good lights and especially the poor use of spot lights; running with one lamp; unlighted rear lamps; bad parking and many others. Law after law and rule after rule has been made and more or less enforced on these defects.

Such is the traffic situation today. The giant of public opinion has been asleep, is now barely shaking off his coverlets. Soon he must arise in his might to fight the fight and win the victory. What are the weapons he must have and how shall he use them? In the first place—

LAW

Law is fundamental in the sense of being directed to the root of things. To direct the personality of the driver a preventive law of selection for fitness, by an examination before a driver is qualified.

A LICENSE LAW

This means a law by which each driver is licensed by a state and so is qualified by and responsible to a state authority. Any United States legislation to accomplish this object would not provide the necessary intimate knowledge needed for control. It must be by small, intimate units, preferably by states. Such a license law, with power of suspension and revocation in a central state authority and properly exercised, will eventually cull out the improper mentality, punish the willful breaker of rules, and gradually bring order out of chaos. As an adjunct to such a law the examination for qualification must be strictly used. As a part of the licensing law and system, there must be rules for conduct, "rules of

the road" providing safe practices to follow as nearly as these can be prescribed.. Willful breakers of such rules must be promptly and severely punished. All these rules relating to willful cases such as driving while intoxicated, evasion of responsibility, and continued cases of reckless driving, must carry disqualification by loss of license. The discipline must be just; good natured in corrective instances, severe in willful cases. *The willful offender must be blotted out.*

As a concrete example of what discipline can do, consider the case of Connecticut, forced sometime since by its great conglomeration of traffic statewide, to adopt a law like that indicated with all of its ramifications and appendages. This state has as a part of its preventive system, statistical files showing each accident as to its location, with descriptive details, each with its causes analyzed and the blame placed for the purposes of its own discipline by loss of license. In that state there are five large cities. In 1922 to July first there were in those five cities 1800 accidents of a major nature. Now the state, by its applied statistics and discipline, by pointing out the causes and locations of accidents to the police, has secured enforcement along aggressive, intelligent, understanding lines so that in the corresponding months of 1923 there are only 714 such accidents. A continuation of its policy and application will undoubtedly further reduce these. The same principles, coupled with town enforcement, are expected to make a reduction in all towns of the state.

Proper law and discipline alone can reduce danger from accidents at least 50 per cent.

EDUCATION

But there is also the great weapon of education. There are classes of persons who are dependent for care upon others, whose intelligence and minds are not fully developed into ability to care for themselves. Chief among these are children.

In another state in the East, where there had been an intensive educational campaign for children, this danger was diminished 30 per cent over the year following. Education in safety must eventually be taught in schools. It must be part of the school curriculum. But it is a fact that teaching must not be limited to the children. Parents, guardians and those in charge generally need teaching fully as much as the children themselves. So, motion pictures, publicity in newspapers, Boy Scout movements, posters, placards and every possible occasion and means must be used. Perhaps a generation must pass before educational labor will begin to show, but the child, a generation hence, with education in these hazards will be more fitted to survive than the child of today, and the child is father to the man. Education must also extend to all those having to do with motor vehicles in other capacity than that of driver. There is no greater fallacy in practice than the law of today that "the pedestrian owns or has a right to the highway and that all vehicles must look out for him." Education and discipline as well must be extended to him. He must be reasonable and right just as the auto driver must be reasonable and right. In fact he must of necessity be the one to give way in a close

case. "He may be right, dead right, as he walks along, but just as dead as if he'd been wrong." So education in care is his portion and he must do more than his share.

Law and discipline through control of the person, helped by education and publicity, all welded together by public sentiment, will do the work. If a concrete general program for combat with highway dangers should at this time be laid out for use, it must include:

1. An adequate law fitted to the state where made, thoughtfully drafted, with consideration for the laws of other states having the same problems. Essential features of this law are a state operator's licensing system and a state statistical system, together providing proper and adequate control in a state authority.

2. State and city highway construction with especial study of and care applied to safety for both the pedestrian and the automobile driver. A safety engineer in each state highway control.

3. State and city supervision by adequate police, as widespread and well covered as possible, so that as much of the state and city traffic as may be will be *directed traffic* or supervised traffic.

4. A constructive plan of safety education beginning with a good safety text book and aided for years to come by the efforts of every safety organization and citizen through every available agency. As a part of this plan are the efforts of this Safety Congress; organized conferences of states; meetings of civic organizations; pictures, posters, publicity and every means at hand.

5. Public sentiment. Wake the giant up and make him work.

There is great hope for the future. No similar problem has long held Americans, and this one will not.

THE WARNING OF PUBLIC ACCIDENT STATISTICS REPORT OF THE COMMITTEE ON PUBLIC ACCIDENT STATISTICS, PUBLIC SAFETY SECTION, NATIONAL SAFETY COUNCIL FOR THE YEAR 1923.

During the year 1922 there probably occurred 75,300 fatal accidents in continental United States. This was an increase over the estimated number for the year 1921 (73,500), and was almost equal to the accident fatality record of the year 1920, 75,900. Although there has been a somewhat halting decline in the accident death rate during the past 10 or 12 years, the absolute number of fatal accidents in the United States has not been less than 70,000 in each of these years. The slight benefit of a slow downward trend of the fatal accident death rate is more than offset by the natural increase in the population.

The fatal accident record of the United States suggests that our people have not yet realized what these facts mean. That between seventy and eighty thousand lives of our fellow citizens are extinguished each year by accidental violence should arouse the interest and active cooperation of every citizen who has any pride whatever in the place his country should occupy among the advanced civilizations of the world. Again your committee wishes to emphasize the disparaging comparison between the

fatal accident record of the United States and that of England and Wales. Here in the United States we have between 35,000 and 40,000 more fatal accidents than we should expect from the record of England and Wales!

The estimate of your committee is that each day, during 1922, 206 American citizens were killed by accident. Of this daily number, 38 are automobile accident fatalities; 35 are caused by falls; 19 by drownings; 16 by burns; nine by machinery accidents; five by street-car accidents and the remainder by a varied assortment of special hazards. Each week there are more than 1,400 fatal accidents. The automobile takes a weekly toll of 266 of our fellow citizens; falls are responsible for a weekly average of 245 accidents; drownings for 134 and burns for 115! Street-car accidents take a weekly toll of 34 lives on the average throughout the year.

UNFAVORABLE PUBLIC ACCIDENT RECORD

Some fifteen years ago, following the introduction of workmen's compensation laws, the American people began to study and to prevent industrial accidents and injuries; the rising toll of fatalities from accidents on our public highways was also brought to public attention, and in certain respects there have been pronounced achievements in the control of hazards which lead to accidents on our public thoroughfares. But with the increasing congestion of our population in cities, the increased use of the automobile, the toll of deaths from public accidents has continued to increase from year to year until at the present time the safety of the person on our public highways is one of the outstanding civic problems which faces the nation.

Your committee estimates that during 1922 there were 14,000 deaths in continental United States which were due to automobile accidents and injuries alone. In 1911, this number was only 2,061. In the former year automobile accidents accounted for 2.6 per cent of the total deaths from accidents. In 1922, the automobile was the chief cause of fatal, accidental injury and accounted for 18 per cent of the total accident mortality budget. In the following table your committee presents a comparison of the estimated accident fatalities in continental United States during 1922 and for prior years.

Estimated Fatal Accidents in Continental United States 1922 and Prior Years

Cause of Accidental Death	Estimated deaths in:			
	1922	1921	1920	1911
All fatal accidents.....	75,272	73,542	75,983	79,255
Accidental burns.....	6,009	6,362	8,088	7,214
Accidental drowning.....	6,992	7,872	6,066	8,806
Accidental falls.....	12,782	12,293	12,557	14,052
Trammatism by machines.....	3,168	1,941	2,660	1,967
Railroad accidents.....	6,883	6,362	7,769	12,179
Automobile accidents.....	13,875	12,293	11,067	2,061
Street-car accidents.....	1,748	1,725	2,128	2,998

PUBLIC ACCIDENTS AND THEIR PREVENTION

Effective action will be taken by American communities to control public accidents only when facts become available on where and under what conditions such accidents occur. Accordingly, in its report for

1922 the committee made available a set of record forms for the use of American cities in reporting and describing their public accident problems. During 1922 and 1923 the committee has endeavored to have these forms introduced in American cities. While it cannot report that the forms have been widely adopted, still, some progress was made in respect to acquainting safety and police officials in a number of cities with the nature and uses of the forms. The committee hopes that the continuation of this educational work will eventually result in the adoption of these forms or of forms similar thereto, by the leading cities, and that current and annual reports will eventually become available so that the public hazards of the several cities may be studied comparatively and historically and the appropriate lessons drawn from this experience. The local organizations of the National Safety Council should be urged to study these forms carefully and to work for the introduction of these records in their cities.

Local councils are requested by the committee to introduce before boards of aldermen and city councils or commissions, the resolution given on pages 13 and 14 of this report, and to urge on every occasion the scientific, systematic study of local hazard conditions.

UNIFORM RECORDS ESSENTIAL IN PREVENTION OF PUBLIC ACCIDENTS

The record plan of the committee consists of five forms. Each form is in two parts. The first is a preliminary, condensed record for the use of the police or safety officer reporting the accident; the second is a somewhat more detailed form for the use of court and headquarters clerks in abstracting the more complete information obtained in court proceedings up to the disposition of the case. The committee planned that the latter form should be used in preparing statistics for local purposes, a carbon copy being sent to the National Safety Council for use in publishing comparative statistics for the cities included in the Council's registration area for public accidents. Copies of the forms may be obtained upon application to the National Safety Council, 168 North Michigan Avenue, Chicago, Illinois.

Mr. A. W. Koehler of the committee, has succeeded in securing the consent of the commissioner of public safety, Rochester, New York, to have the forms outlined by the committee used in that city. At the present time, Rochester is experimenting with a group of forms outlined by the chief of police of that city in general harmony with the forms suggested by this committee. Monthly reports are submitted to the chief of police by the inspectors in charge of safety supervision in the several districts and these reports are consolidated in the annual statement. The developments of this reporting system in Rochester will be observed with great interest by the committee and by students of the public safety problem.

A PLAN FOR THE STUDY OF TRAFFIC MOVEMENT AND TRAFFIC ACCIDENTS IN AMERICAN CITIES

The committee feels that the practical solution of the public safety problem depends upon a comprehensive analysis, first, of the facts for

traffic movement in cities, second, upon adequate facts on *traffic accident occurrence*, and, third, upon the *intensive study of localized traffic movement and traffic accident problems*.

The traffic problem is too complex to be solved by a few formulas or generalizations based on half-information. No one can say how the traffic situation in any locality is to be treated unless, with basic principles in mind, he thoroughly studies the problem and gets rock-bottom facts. Thus he secures and organizes the facts which suggest their own best remedies. Few municipal officials have attempted a thorough investigation of traffic conditions because of the mass of detail and the obstacles arising out of legal, financial, commercial and political conditions. Since these obstacles can only be overcome by adequate and complete presentation of the facts, it is essential that each city make a study of its own problem and present the data and conclusions to the public. The committee suggests in the following section of this report, prepared by Mr. Kelcey, avenues of investigation by municipalities in order that this may lead to development of a plan of action which will take advantage of every existing opportunity to improve traffic conditions with the least expense. The committee has suggested that such study of traffic, and of traffic accidents, should be considered under three main heads and the detailed consideration of these important factors is given below.

TRAFFIC MOVEMENT STUDIES

Your committee urges that the first effort of any city should be to describe the facts for *traffic movement* within the city. As an aid to such procedure the committee recommends that each of the cities prepare a "traffic-artery" map. This should show the main traffic arteries of each community into the heart of the city, with its entrances which drain adjacent areas. Such a map (see page 17), would show how traffic should be directed in definite channels, how traffic control can be simplified and conditions greatly improved. The map will show which areas are sources of, or which receive, large volumes of traffic, what the flow is between such areas into and out of the city, the location of congested areas and of critical traffic situations such as bottle-necks or heavily congested points. The map should show the main traffic arteries in one color with heavily traveled secondary streets in another color. With a third color it should be possible to indicate routings not at present available, but which can be used if improved. Your committee feels that *traffic congestion* in most cities is due to the *ineffective use of street areas rather than the lack of them*.

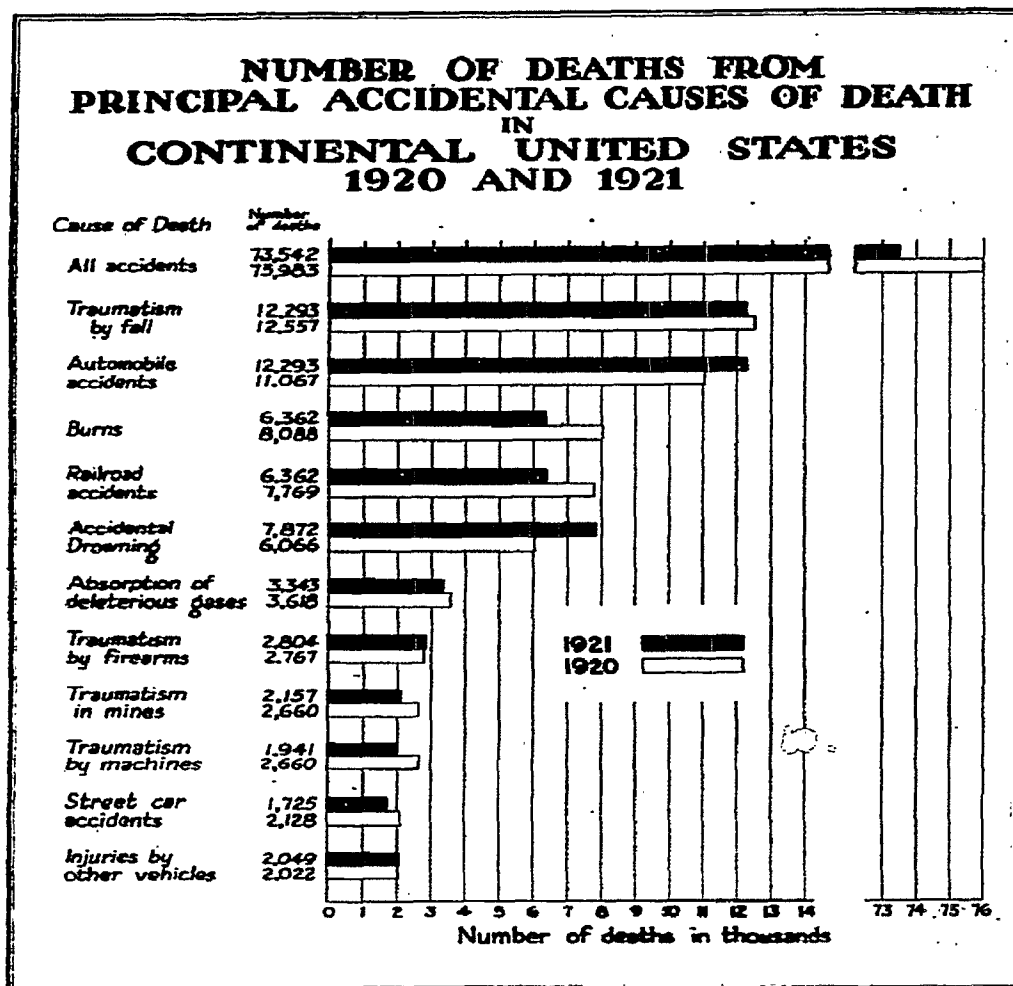
The business sections of nearly all cities are used as distributing points by traffic en route to all sections. This traffic map would indicate that the movement should be routed around the business section because it interferes with the necessary use of such streets. As an example of what an adequate map can do, your committee found one city to have little used streets, which, when linked up, served to carry about 10,000 vehicles a day between two areas in twenty minutes less time! Such a map would enable a city to develop right-of-way stop plans for main arteries, block

systems and one-way streets. It also would suggest the further development of safety zones, the regulation of parking, the supervision of street-car traffic, the economic dispatch of commercial transportation, with the consequent reduction of delivery costs for business establishments, and would, in other ways, pay for itself many times over in beneficent end-results. (See Chart VI.)

TRAFFIC ACCIDENT SPOT-MAPS

As part of its function of recommending ways and means for gathering information on municipal traffic problems, your committee recommends

CHART I



that each city maintain *spot-maps of traffic accident occurrence*. By means of a map of this kind it would be possible to identify conditions such as the lack of traffic discipline, the location of troublesome, specific situations and the need for intensive study of these local problems. Few of the cities have accident spot-maps which show where accidents occur, the type of accident and the degree of their gravity. If each of the cities were to start a new spot- or pin-map each year, it would be possible by watching the locality distribution of the accident record to begin immediate investigation of localized problems. There is hardly anything quite so important as this graphic method for locating specific situations which call for intensive study and control. In one city, for instance, it was found that almost 30 per cent of all serious accidents were concentrated at 87 points. In another city 28 per cent of all recorded accidents were at 64 points; in another city, 46 per cent of all accidents were at 57 points. Information of this character points the way to definite and effective action. When cities begin to maintain maps of this kind, the need for proper traffic accident reports will be realized. Since the committee has already outlined a plan for effective traffic accident records, cities have at hand the means for making the sort of studies which will, eventually, lead to a decided improvement, not only in traffic movement which is essential to the economical conduct of business, but to the reduction of the regrettable record for fatal and other sorts of traffic accidents. Today from 80 to 90 per cent of all traffic accidents usually occur outside of congested districts and approximately 70 per cent of these accidents are found at street intersections. In the lack of proper record control, the committee observes that under prevailing conditions traffic can be counted upon to follow lines of least resistance in spite of all *general* regulations to the contrary. What is needed is specific information on local situations! The committee, accordingly, has drawn up, for the information of cities, charts showing how local traffic movement and traffic accident problems should be studied and solved. In the charts on pages 17, 21, 22, 23 and 24, the committee has shown, first, a traffic movement map; second, a traffic accident spot-map and third, a chart showing typical, or key, traffic problems with their graphic solution. This interesting and important subject has been fully developed by Mr. Kelcey in his paper, which is appended to this report.

It is earnestly hoped that American cities will seriously consider this plan for a more comprehensive study of problems of traffic movement, of the distribution of traffic accidents and of the solution of typical or key problems.

THE AUTOMOBILE ACCIDENT RECORD OF AMERICAN CITIES IN 1922

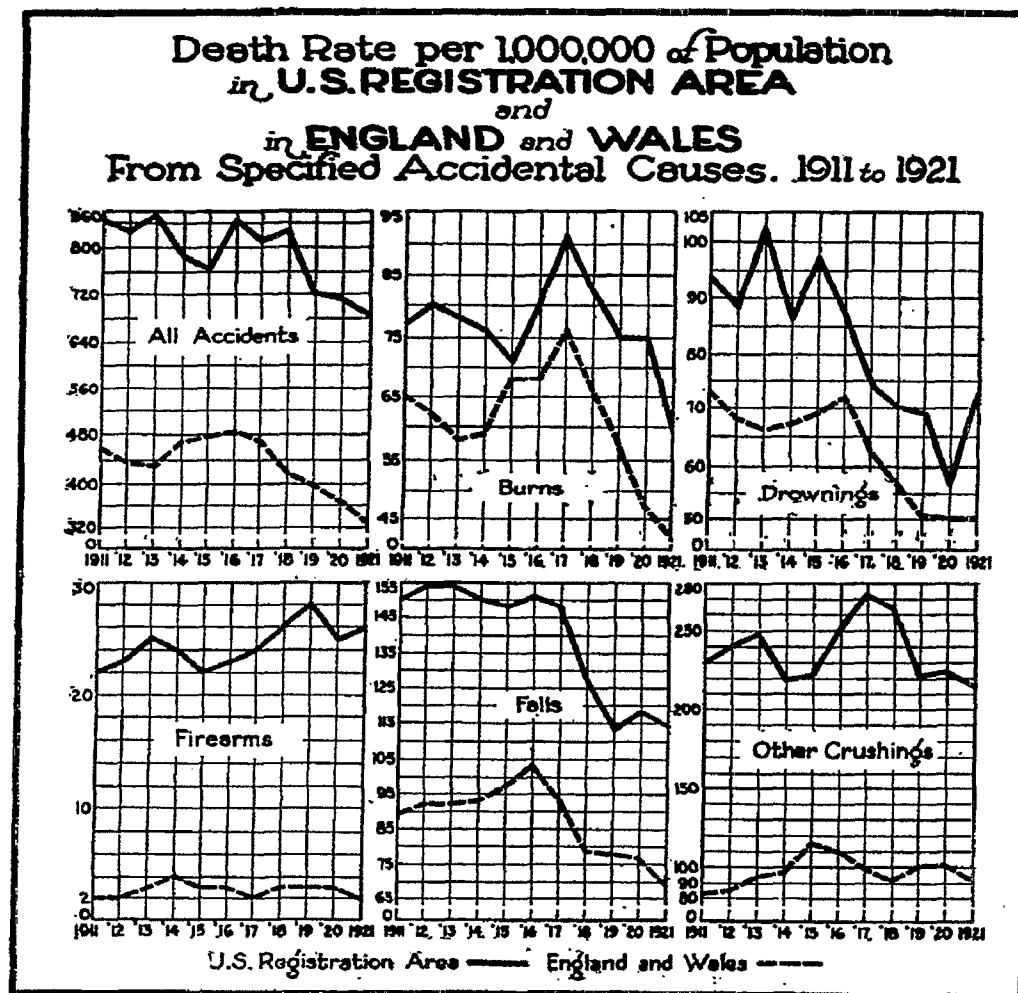
Mr. Stellwagen of the committee, has again made available his study of automobile accident fatalities in American cities.

The registrars of 109 American cities reported on the automobile accident situation for the year 1922. It was found that for this group of cities the automobile accident death rate increased 11 per cent over the figures for 1921 for the identical cities. The cities included in the survey

ranged in population from 25,000 upwards and were scattered over the entire United States. Their estimated midyear population as of July 1, 1922, was 28,499,032.

Applying these figures to continental United States, Mr. Stellwagen estimated from his sources, as did the committee from other information, that there occurred during the year 1922, approximately 14,000 fatalities arising out of automobile accidents. Based upon the number of automobiles registered there were, in 1922, 11.4 deaths per 10,000 cars registered and 12.8 per 100,000 of population; this may be compared with the figure of

CHART II



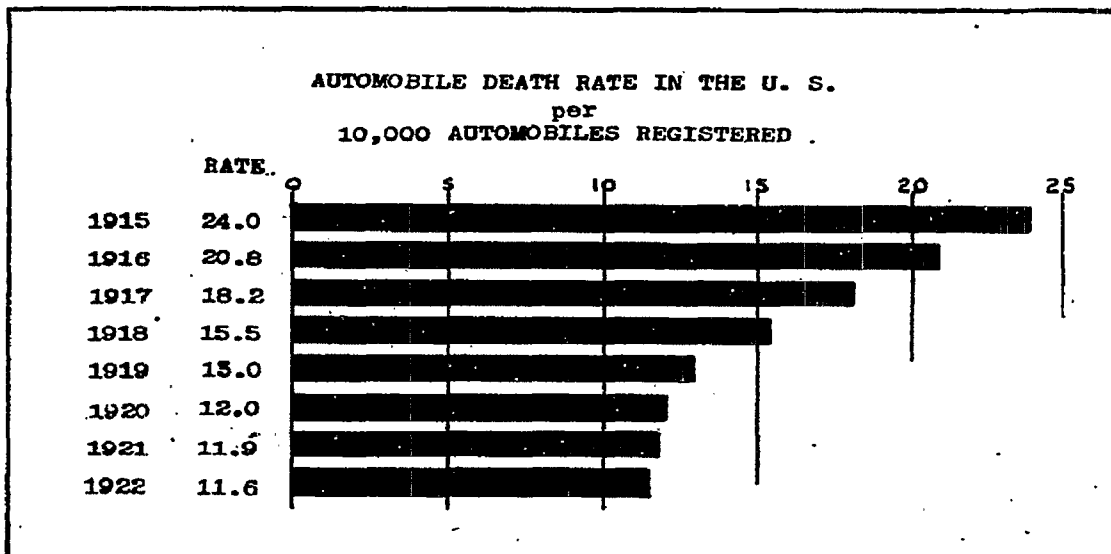
11.8 deaths per 10,000 cars registered in 1921 and 11.5 per 100,000 of population. The details of Mr. Stellwagen's compilations are given in tables 1 to 15, in the appendix.

In 91 of the 109 cities, facts were available on the automobile fatalities by two age groups—under 15 years of age and 15 years of age and over. Out of a total of 3,204 persons killed in the 91 cities, 1,180 or 37 per cent were children under 15 years of age. In New York City 50 per cent of those killed by automobiles were children.

Table 7 ranks the cities of 100,000 population and over according to their automobile accident death rate per 100,000 population. Cities of less than 10,000 population were not included in this population comparison because the number of accidents in them was too small to be indicative. Los Angeles had the highest death rate, 32.5 deaths per 100,000 of population, and Jersey City the least, 8.2 per 100,000:

With respect to the number of deaths per 1,000 automobiles registered the facts are shown in table 14. This would indicate that Chicago has the highest ratio of automobile accident deaths per 1,000 automobiles registered, and Spokane the least. Los Angeles, which had the highest death rate, based on population is twenty-second in rank when its death rate is based on automobile registration. Memphis has the third highest death rate based on populations, but is thirteenth in the list of cities ranked according to the death rates per 1,000 automobiles registered. Spokane is next to the last in table 7, and is last in table 14. We show several graphic charts with this text which may be of interest to our readers.

CHART III

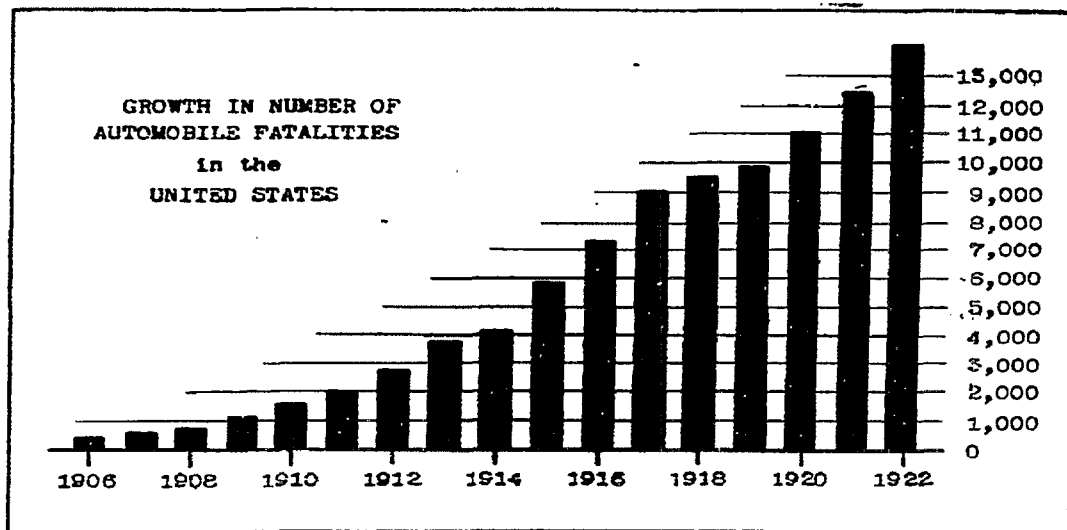


Automobile fatalities in the cities continued to increase at a greater rate than fatalities caused by other vehicles. In table 13 we show that there was no increase in a group of 103 American cities (1922 over 1921), in the death rate from steam railway accidents and that there was an actual decrease of nearly nine per cent from deaths in street railway accidents. The classification "other vehicles" where the deaths are caused by motor cycles, bicycles and horse-drawn vehicle accidents shows an increase.

**EXCLUDING DEATHS FOLLOWING AUTOMOBILE ACCIDENTS OUTSIDE
CITY LIMITS**

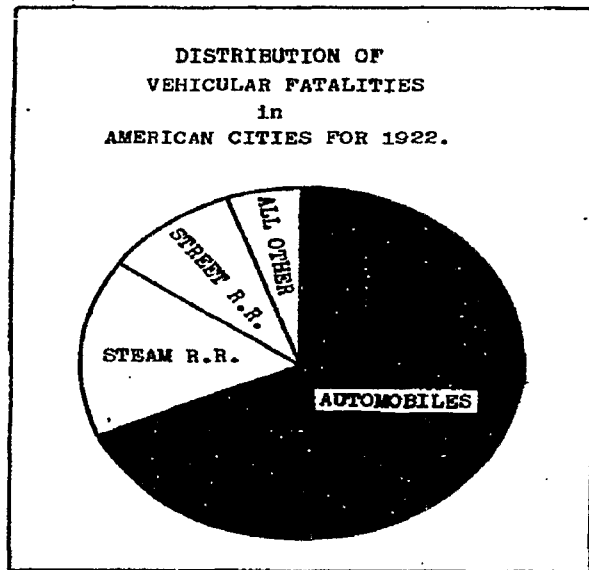
When the report of the committee was circulated in 1922, a number of safety officials and health officers of the cities remarked to the committee that the intercity comparisons were not entirely fair, because the fatal accident records of the respective cities do not always reflect the traffic hazards of those cities. In many instances deaths reported for a city arose out of accidents which occurred outside the city limits. In its 1923 report, the committee accordingly made an effort to divide automobile fatalities according to the place where accidents occurred. In table 15 we show for 48 cities the automobile accident deaths which arise out of accidents occurring (a) within the city limits and (b) outside the city limits. Out of the total of 912 deaths ascribed to the 48 cities listed in table 15, 141, or 15 per cent, resulted from accidents which occurred outside the city limits. On the other hand, many accidental deaths of residents of these

CHART IV



very cities probably occurred in other places. It is, therefore, not really so unfair, for the want of a more accurate figure to use the official death rates for automobile accidents as fairly indicative of the truth.

CHART V



ECONOMIC ASPECTS OF THE AUTOMOBILE HAZARD

One of the major expenses devolving on an automobile owner is the cost of his public liability insurance. Automobile public liability insurance indemnifies the motorist against loss by reason of his legal liability to members of the public for bodily injuries, including death, caused by the operation of his automobile. Most motorists recognize the necessity of taking out public liability insurance before operating their automobiles. The data on collision and property damage insurance costs are not conveniently available at the present time.

The following tabulation shows the automobile registrations separately for private passenger and commercial cars, together with the average automobile liability insurance rates charged in 28 out of 33 cities, which had a population of 200,000 or over in accordance with the 1920 census. On the assumption that all of the automobile owners in these 28 cities take out public liability insurance, the annual outlay for that one item is \$107,363,000.

MAIN POINTS IN GENERAL ACCIDENTS STATISTICS COMPILED
BY THE COMMITTEE

Now, automobile accident insurance rates are based on the accident experience of insured cars in individual cities. If the number of automobile accidents in any one city increases, then the losses which the insurance companies are called upon to pay increases in proportion, and the

CITIES	No. Cars Registered		Average Liability Premium per Car	
	Passenger	Trucks	Passenger	Trucks
1. New York City.....	216,516	67,397	\$119	\$220
2. Chicago.....	175,000	30,000	45	80
3. Detroit.....	148,424	21,178	34	62
4. Cleveland.....	82,065	16,461	56	105
5. St. Louis.....	76,763	14,409	45	80
6. Boston.....	41,037	10,963	56	105
7. Los Angeles.....	175,000	21,000	27	44
8. Buffalo.....	40,000	10,000	56	105
9. San Francisco.....	67,844	5,616	27	44
10. Milwaukee.....	31,500	7,900	27	40
11. Washington, D. C.....	43,509	6,723	27	40
12. Newark.....	45,000	5,000	34	62
13. Cincinnati.....	36,851	8,607	34	62
14. New Orleans.....	21,258	7,218	27	40
15. Minneapolis.....	55,000	15,000	34	62
16. Kansas City.....	55,000	7,500	34	62
17. Seattle, Wash.....	53,000	7,000	27	44
18. Indianapolis.....	47,000	9,400	27	40
19. Rochester.....	35,000	7,000	27	44
20. Portland.....	37,351	5,773	27	44
21. Denver.....	42,971	2,878	27	40
22. Toledo.....	37,653	7,435	34	53
23. Providence.....	24,281	4,260	45	80
24. Columbus.....	32,577	5,432	27	40
25. Louisville.....	26,748	5,257	34	62
26. Oakland.....	21,122	1,800	27	40
27. Akron.....	29,815	5,525	34	53
28. Atlanta.....	16,200	4,000	27	44

increased cost is passed on to the public in the form of higher insurance premiums. If, on the other hand, automobile accidents decrease, then the losses for which the insurance companies are liable also decrease, and the public enjoys a reduction in the insurance premiums it is called upon to pay. Thus, it appears that if the number of accidents and, consequently, the amount of losses incurred in the 28 cities was reduced ten per cent, there would be a net saving of \$10,736,300 to the automobile owners concerned.

In the appendix, the committee has shown certain facts on the general accident mortality record of the United States. These data are given because they are not readily available in published sources and because there was such a favorable response to the data in the committee's report for 1922. The committee felt that not only should it endeavor to present ways and means of studying public accidents, but that it also was under obligation to publish concentrated data on general accident occurrence.

Table 1, in the appendix, shows the committee's detailed estimates of accident fatality in continental United States. The table given in the introductory pages of the report shows only the more important causes of fatal accidents, for which an estimate could be made for the year 1922. In table 1 of the appendix no 1922 estimates are made, but more details are shown for the year 1921, the latest year for which mortality data are available at the Census Bureau. Table 2 gives an estimate of accident fatalities per week and per day in 1921 and 1920.

A comparison of crushing accidents in the United States and in England and Wales during 1921 is shown in Table 3. Tables 4 and 5 give various age statistics, which were requested by several students of the accident

problem after the 1922 report of the committee was published. These data will be of interest to a considerable number of readers of the present report. The percentage of fatal accidents at the various age groups is shown in table 4. Trends of accident mortality are indicated in table 10 for both the United States Registration area and the industrial department of the Metropolitan Life Insurance Company over the period 1911 to 1921. Certain data on the age distribution of the several broad classes of accidents according to origin of hazard are set forth in table 8. In table 9, for certain titles of the International Classification of Causes of Death, a distribution of accidents, according to origin of hazard is shown.

Mr. Stellwagen's data on automobile accidents in cities follow in tables 12 to 15.

CONCLUSIONS BY THE COMMITTEE FOR 1923

1. That each community prepare maps showing traffic movement along main arteries and subsidiary channels in order that traffic distribution and control may be made effective.
2. That each community prepare spot-maps of the occurrence of traffic accidents, so that local centers of hazard may be identified.
3. That intensive study be made of such local centers, graphically, and proper solutions indicated.

That local councils endeavor to have introduced by their police and safety officials the uniform reporting cards prepared by the National Safety Council and that the resolution herewith presented be adopted, on the initiative of local councils, by boards of aldermen, common councils of cities and by city commissions.

RESOLUTION

The committee urges local safety councils, wherever possible, to have the following resolution adopted by boards of aldermen, common councils and city commissions:

WHEREAS: More than 14,000 of our fellow citizens were killed by automobile accidents on our public highways last year, and probably 15,000 will lose their lives in 1923 for this cause alone, and

WHEREAS: The prevention of these accidents depends upon accurate records of facts on when, where and how these accidents occur, and

WHEREAS: Such information can be obtained only if cities use uniform and complete schedules for the recording and cooperative reporting of such accidents,

THEREFORE BE IT RESOLVED: That the.....

(Board of aldermen: Common council)

of..... urges that the uniform reporting cards for public accidents,
(City)

as devised by the National Safety Council, be used by the Police Department of the City of.....beginning with the first day of.....,192....

THE ATTITUDE OF THE MOTORIST TOWARD TRAFFIC REGULATIONS

STEPHEN S. TUTHILL, VICE-CHAIRMAN, BROOKLYN SAFETY COUNCIL,
BROOKLYN, N. Y.

This subject is loaded to the muzzle. I, myself, am highly charged with convictions based upon a two years' intensive study of the whole problem of street traffic regulation.

If I wished summarily to dispose of this subject, I should simply suggest that you stand for five minutes upon any unpoliced street corner anywhere in this land, or that you sit beside a traffic court magistrate, as I have frequently done, or examine the records of our New York City traffic courts, or, the greatest indictment of all, *that* you squarely face the automobile death and accident statistics of this country, now registering at the rate of 15,000 deaths a year, or one death every 50 minutes, and 1,700,000 injuries a year. This means that one person out of every 70 of our entire population will be killed or injured by an automobile during the current year.

What makes this statement so tragic is the fact that it can be practically eliminated. The public cares not for the ratio of automobile deaths and accidents to the population; it demands that these killings and maimings cease.

Gentlemen, it is not my intention thus summarily to dispose of this subject; it is, on the contrary, my purpose to strike from the shoulder.

Our press and our public speakers talk a great deal about "bleeding Europe." Is it not time that they took up the question of "bleeding Americans" and how to stop "bleeding Americans?"

Let us get a proper perspective.

A well-known safety engineer recently said that fifteen years ago a majority of the owners and drivers of automobiles were citizens of some means and responsibility. Today, the millions of low-priced cars manufactured and the enormous number of second-hand cars thrown on the market each year make possible the ownership of cars by a class of citizens, especially of young men, who are of the more reckless type. People of this class easily become victims of what is known as "Gasoline rabies," or "Gasoline madness."

Since this subject was assigned to me, I have discussed it with chauffeurs and with all classes of owners. I have also discussed it with the pedestrian. It is surprising to see the changed viewpoint of the motorist when he becomes a pedestrian.

As a general rule, the motorist resents any infringement of his so-called "personal liberty" and views lightly his obligations to the public upon whose sufferance he operates.

Today, the differences between Capital and Labor are no more marked than are the differences existing between the motorist and the pedestrian.

DIFFERENCES ARE PSYCHOLOGICAL

It is the law of psychology that those who are in a superior position always press their advantages and maintain it to be their right to do so. It must be admitted that the man awheel occupies the domineering position over the man afoot.

Fast driving seems to bring on a delirium and beclouds the instinct of caution and sense of justice.

Another factor is the existence in nearly every state of the union of not only a marked disrespect for law but also a woeful lack of enforcement of law.

The pedestrian, as an American citizen, naturally resents any intrusion upon his prior constitutional rights, and especially if that intrusion be by force.

The driver calls the pedestrian a "jay-walker;" the pedestrian replies, "auto-hog," and the conflict goes merrily on, while the death and accident roll goes disgracefully upwards.

I might say that the term "jay-walker" is a misnomer in more ways than one, for, if the so-called "jay-walker" did not hop, skip or jump, he would more than likely find himself in the hospital or in the morgue.

Let me read an editorial published in the "New York Herald" of August 23d:

"The prior right of pedestrians to the use of the streets continues to be upheld by the courts. In the Homicide Court, Magistrate Norman J. Marsh, holding a motorist in bail for the Grand Jury, expressed himself as follows:

" 'Pedestrians are not required to cross streets at the usual crossing, although they should exercise greater care when they do so elsewhere.

" 'It is not enough for an automobilist to blow a horn.

" 'When pedestrians are endangered the automobile should be brought to a stop'."

"The burden of avoiding running down a pedestrian remains on the motorist even though the pedestrian has placed himself in what might easily become a dangerous situation.

"The legal basis for this view has recently been set forth in detail by Magistrate Frederick B. House of the Traffic Court.

"I want to say to you that Judge House is without doubt the highest authority on street traffic regulations in this country."

Judge House said:

" 'As a matter of fact, nobody has any inherent right to run an automobile at all, astonishing as this statement doubtless is to many people. The courts have held that the right to operate a motor vehicle is a privilege given by the state, not a right, and that privilege may be hedged about with whatever limitations the state feels to be necessary, or it may be withdrawn entirely.

"'As a matter of law, if the legislature were in session today it could pass a law absolutely prohibiting the operation of motor vehicles in the State of New York, and if the law were signed by the Governor that would end the operating of automobiles. If it were more generally understood that the operation of an automobile is not an inherent right people might be more ready to listen to the reason as to how they must be operated in order to protect the rights of the public'."

The Herald editorial concludes: "This doctrine should be expounded so often that no motorist could miss its meaning. The state has power to withdraw the privilege of operating an automobile from any individual who offends against traffic laws drawn for the public safety, or to prohibit entirely the use of automobiles on the highways. When fines and even jail sentences fail to check the rising tide of street accidents the state might well have recourse to a broader use of its power to cancel licenses. Under the procedure recently suggested by the special committee of the grand jurors of Kings County, New York County and Bronx County that would appear to be the most effective weapon the state can employ in defense of pedestrians against reckless persons."

Brooklyn Traffic Court Magistrate Lawrence C. Fish is another jurist who publicly subscribes to this view of the prior right of the pedestrian.

At the formation of the Brooklyn Safety Council, President Arthur S. Somers, of the Brooklyn Chamber of Commerce, who presided, said that while at one time Magistrate Fish was one of the most cordially hated of our judges, he had finally earned for himself the respect and regard of the entire borough by his uprightedness and integrity on the bench.

In a number of our states this prior right of the pedestrian is upheld by statute and by court decisions. Any modification of this prior right of the pedestrian to the use of our streets would be in contrary to the common law of the land.

Why, may I ask, does the great American Railway Express carry a sign on its motor and horse drawn trucks, reading: "Safety First: pedestrians have the right of way; in case of doubt, stop: take no chance of injuring anyone."

THE IRRESPONSIBILITY OF MOTOR LAWS

Now that we have analyzed the position of the two always interested parties in the attitude of the motorist toward traffic safety regulation, let us go ahead and talk about the others who are even more responsible for this attitude of the motorist which is contributing so disgracefully to our record of street killings and maimings in a land where we are supposed to be able fully to enjoy life, liberty, and the pursuit of happiness.

The present New York State Motor Vehicle Law, not unlike the motor vehicle laws of many other states, is responsible for more deaths and injuries than any law ever in force in time of peace.

Let me say that public opinion will demand at the next session of the legislature an adequate motor vehicle law, and that one of the principal requirements will be that more of the state revenues from automobiles shall be used for the enforcing of such a law.

So far as licensing is concerned, we shall never have a proper state motor vehicle law unless it places the issuing supervision and control of the licenses absolutely in the hands of the police authorities of our municipalities.

Speaking before Mayor Hylan's special traffic committee early this year, I said, and it was not contradicted, that within one week the automobile killings in New York City could be reduced one-half and its automobile accidents two-thirds.

But before this could be done, the Board of Estimate and Apportionment of the City of New York would have to sanction an increase of the police force sufficient to police the more than 4,000 now unguarded dangerous crossings in that city.

With all due respect to those who are working from other angles on this greatest of our civic problems, there is positively no substitute, mechanical or otherwise, for the individual policing of the street crossing.

Before this could be done, our police departments would have to substitute the word "effective" for the word "practical" in their traffic lexicon. This is not a question of business or of dollars; it is a question of human life.

It is the death rate, not the tax rate, which should concern everyone of us, no matter what our other interests may be.

Before this could be done, some of our grand jurors would have to be converted to the fact that an automobile killing is not justifiable or excusable homicide.

Before this could be done, some of our traffic court judges, too sympathetic and too apologetic for such red-blooded work, and would have to be replaced by men who would not hesitate to put the fear of God into the hearts of smirking defendants, to whom a fine is only a joke.

We need more traffic judges like Judges Fish (Brooklyn), House and Marsh (New York), Bartlett (Detroit), Chambers (Los Angeles) and Corlett (Cleveland)—judges who will not only fine flagrant violators of our traffic laws, but also jail them or revoke their licenses for adequate periods.

Judge Bartlett said to me: "Jail sentences, in my opinion (and about 80,000 cases have gone through my hands of large and small violations) do absolutely stop the reckless driver."

He also says that "the record of our Detroit traffic court shows that only three men who have been sent to the County Jail or to the House of Correction have ever been brought to the court on a second charge."

Judge Bartlett also contends that "human lives are more important than anything else in the world, and no methods can be too severe to save life and limb."

MUST ENFORCE EXISTING LAWS TO THE LETTER

I maintain that before trying to change local traffic ordinances or reconstructing any part of a city, we should try to enforce the existing ordinances to the letter, with the view of determining their sufficiency or insufficiency.

Why not universally visualize safety for the motorist and for the pedestrian by marking all dangerous corners with broad white lines, and then guard them adequately?

Parsimony and greed are the foundation-stones upon which will rest the monument to the 15,000 killed and the 1,700,000 injured by automobiles in this country in 1923.

An authority on the subject says: 'The total of American Casualties in the World War—1917-1918 were 317,387; our total automobile casualties in the same period were 427,000; leaving to the credit of the automobile as the destroyer of life and limb 109,613.

By no means am I going to overlook the automobile industry, its allied industries and its affiliations.

Now, who should be more constructively interested in the attitude of the motorist toward traffic safety regulation than these industries and associations?

You know, as well as I do, how highly organized for defence is this third most important industry of this country.

Despite the educational work of the admirable trade associations of the automobile industry, the death rate continues steadily to climb.

Let me suggest that these gentlemen endeavor to convince the motorist that he is bound legally to operate his car so that pedestrians may safely cross our streets and highways, or that there may be a day of reckoning for all concerned.

If necessary, and it will be necessary, let them spend some of the time they devote to legislative work not only in protecting the automobile, but also in protecting the defenceless walking public.

One of the sanest men in the automobile industry is Glenn A. Tisdale, President of the Franklin Motor Company. It is reported that Mr. Tisdale believes in cutting down the speed of the automobile, not only because it is humane, but also because it is good business. He also believes, it is reported, that it is time for the automobile owners, manufacturers, dealers and all others interested in the industry to stop fighting any and all legislation for the regulation of automobiles and to unite upon some means of bringing to an end this reign of killing and maiming.

Right here let me sound my warning to the men named by Mr. Tisdale.

If they do not get on the job and keep on the job of changing the attitude of the motorist toward traffic safety regulation, so that our streets and highways may be made safe for both motorists and pedestrians, they will shortly find themselves under federal regulation, and eventually in the position of the brewing and distilling interests at this time. Increasing consumption at the expense of the public good sounded the downfall of the liquor interests, and history has a habit of repeating itself.

The pedestrian public is fast passing from an unvocal, unorganized and unheeded majority in this matter.

More and more are they saying that no man or government has the right to place so potential an instrument of destruction, as is the motor car, upon our streets and highways and in the hands of a man or woman who has not been rigidly and thoroughly examined to determine his or her fitness and moral and financial responsibility in the premises.

THE GROWING DEMAND FOR SPEED CONTROL

Another growing demand is for a mechanical controller upon the speed of motor vehicles, now built and sold with more than twice the speed which is presumptive evidence of recklessness. Another glimpse of the popular mind on this subject is that the walking public is beginning to resent being "public-safety-weeked" out of their prior rights in our streets.

Safety weeks are all right if you only have enough of them in the course of a year, and 52 is not one too many.

Néver was the help of the press more needed than in this emergency. Here and there we find a newspaper, like The Brooklyn Daily Eagle, taking hold of this traffic question without gloves; but the supineness of the newspapers of this country in the face of an American automobile annual death-toll of 15,000 and an American automobile injury list of 1,700,000 is a blot upon the escutcheon of the Fourth Estate.

For several years the Kings County Grand Jurors' Association, of which I am also a member, has been working upon the question of street safety. This body of public-spirited citizens, at their own cost, carried through Safety Week in 1922. In that week they reduced the automobile death rate in Brooklyn from 23 to 6. Realizing, however, the immensity of this work, they contracted with the Brooklyn Chamber of Commerce, resulting in the Brooklyn Safety Council, now organized. Already many of our streets have been marked by broad white lines, traffic towers are in the course of erection and the police department is backing the movement to the limit of its available resources.

To be effective, we found, the safety education of the motorist and pedestrian, and that, of course, includes the children; must be constant, impartial and closely tied in with the press and with the authorities charged with the administration of the traffic and education laws.

The National Safety Council is doing a splendid work on the industrial safety side.

It is better fitted than any other organization to undertake the wiping out of these blood-stains upon our civilization.

This it can do by promptly calling in each state a council of the representatives of all the interests which I have named, and then and there determining upon and carrying through a plan of concerted action, having only one end in view, the conservation of life and limb upon the streets and highways of the United States of America.

Gentlemen, while self-preservation may be the first law of nature, for God's sake don't let us forget that the preservation of the lives of our fellow-men is the first law of civilization.

HOW SAFETY ACTIVITIES FOR CHILDREN REDUCE ACCIDENTS

LEW R. PALMER, CONSERVATION ENGINEER, EQUITABLE LIFE ASSURANCE
SOCIETY OF THE UNITED STATES, NEW YORK CITY

On a recent trip made in the interest of National Life Conservation in general and Public Safety in particular, it was my privilege to study some of the work being done by the local safety organizations in Omaha, Denver, Salt Lake City, Spokane, Portland, Tacoma, San Francisco and Los Angeles, and in every instance the subject of Child Safety was uppermost in the minds of those directing the public safety work in these various places. This was to be expected; first, because there is nothing more tragic than the accidental death of an innocent child, and, second, it is coming to be recognized that in the education of the child lies the hope of success for our Public Safety work.

In order to indicate the importance of this phase of our Public Safety work your attention is called to the following startling records:

From information obtained through National Safety Council headquarters we learn that in 62 cities there were, in 1922, 3,372 automobile fatalities, of which 1,334, or 40 per cent, occurred among children.

It has been estimated that there were 14,000 fatalities in the United States resulting from automobile accidents during the year 1922, and on the basis of the 40 per cent ratio above developed we might assume that there were 5,600 children killed in "peaceful America" from this one cause in a single year.

From the 62 cities from which 1922 data is available we have selected two groups, designating them as the major and minor leagues. This sounds a bit more civilized than the big and little arena.

CHART I.

Rank	City	Population	Number of Children Killed	Number of Children killed by Automobiles per Million Population
1	Wilmington, Del.	110,168	3	27.2
2	Omaha, Neb.	191,601	7	36.5
3	Louisville, Ky.	234,891	10	42.6
4	Springfield, Mass.	129,563	6	46.3
5	St. Paul, Minn.	234,595	11	46.9
6	Dallas, Tex.	158,976	9	56.6
7	Grand Rapids, Mich.	137,634	9	65.4
8	New Bedford, Mass.	121,217	9	74.2
9	Bridgeport, Conn.	143,538	12	83.6
	TOTAL	1,453,183	76	52.3



CHART II.

Rank	City	Population	Number of Children Killed	Number of Children killed by Automobiles per Million Population	
1	Portland, Ore.	258,288	7	27.1	██████████
2	Milwaukee, Wis.	457,147	15	32.8	██████████
3	Washington, D. C.	437,571	16	36.6	██████████
4	Kansas City, Mo.	324,410	13	40.1	██████████
5	Minneapolis, Minn.	380,582	16	42.0	██████████
6	San Francisco, Cal.	508,410	24	47.2	██████████
7	Newark, N. J.	414,216	23	55.5	██████████
8	Baltimore, Md.	733,828	43	58.6	██████████
9	Detroit, Mich.	993,739	63	63.4	██████████
10	New York City, N. Y.	5,621,151	413	73.5	██████████
11	Cleveland, Ohio	798,836	65	81.6	██████████
12	Chicago, Illinois	2,701,705	248	91.8	██████████
13	Pittsburgh, Pa.	588,193	71	120.7	██████████
14	Denver, Colo.	256,369	45	175.5	██████████
	TOTAL	14,472,443	1,062	73.4	██████████

In the major league we have included all of the cities (14 in number) which have a quarter of a million or more population, and which reported to the National Safety Council for 1922. For the minor league we have selected all other cities on the National Safety Council list (9 in number) which have a population of 100,000 or more, and in which there is a local of the N. S. C. It is regrettable that the Council did not receive reports on children's fatalities from the following cities, in whom there are local councils: Boston, Buffalo, Spokane, Philadelphia, Providence, Rochester, St. Louis, Seattle and Worcester.

Charts 1 and 2 have been developed on the number of fatalities to children per million population, due to the automobile. It is interesting to note that the city holding first rank in the major league is a Western city, and the city holding first rank in the minor league is an Eastern city. Furthermore, their respective fatality rates are almost identical, with the honors slightly in favor of Portland, Oregon.

Having geographically located our highlights, we take pleasure in assisting the Oregon and Columbia Basin Division of the National Safety Council, and the Delaware Safety Council to bring their light out from under the bushel.

To Mr. Hugh H. Herman, general manager of the first-named Council, we are indebted for the following record of how children's safety activities are being promoted in Portland, Oregon:

OREGON AND COLUMBIA BASIN DIVISION REPORT

Automobile Drivers' School: Every year we conduct a school for automobile drivers. The course consists of seven lectures on the basis of the outline prepared by the national organization. The subjects covered last winter were: the engine, lubrication, traffic accidents, electric system, brakes, clutch, transmission and tires, the violator of law and common sense. The best available experts in these lines present the subjects, and each stresses throughout the subject of accident prevention. The lectures were well attended.

School Safety: We have a permanent, continuing organization in the public schools of the city. Each half year we reorganize the safety committees in each of the 72 grammar schools of the district. In each school committee is a subordinate committee, known as the Safety Patrol, whose duty it is to pay particular attention to the street hazards before and after school and during intermission. The committees combined constitute the Portland Junior Safety Council. Each member of the committee is supplied with a button bearing the universal safety emblem, and each member of the Safety Patrol is provided with a green band with the words, "Safety Patrol," in white letters. During the school year one of our men, H. P. Coffin, devotes practically all of his time to making the rounds of the schools, meeting with these committees, and addressing assemblies of the pupils. Of these there have been 156 meetings during the year, in which the 49,000 school children heard safety talks.

In addition we have organized the Junior Safety Officers, consisting of three boys from each school. Mayor Baker invests these officers with a metal badge, or "star," which is the symbol of his office. They are known as the "Mayor's Junior Safety Officers." It is their duty to report through their principals violations of the traffic laws in the vicinity of their schools and in general to help prevent accidents on the streets and on the playgrounds.

The text used in this work is "A Course of Study for Safety Education in Oregon Schools," prepared by us, issued and made a part of the Compulsory course of study by the State Superintendent of Schools.

In the school bulletin, issued each week by the City Superintendent and distributed to every teacher in the district, we have a column in which we outline the work of the committees to be taken up during that week. We also have in each school an accident chart on which all accidents to school children are recorded. The interest of the children in each school in keeping their chart free from red discs, denoting accidents to pupils of that school, is aroused, and a healthy spirit of rivalry is thus fostered. On this chart are recorded both traffic and school accidents. For each month during which there occur no accidents to children of a particular school, a green disc is pasted on the chart.

Junior Safety Rallies: A general rally of the Junior Safety Council is held once a year in the auditorium of one of the large high schools. All committee members and their principal or teacher advisors are in

attendance. The mayor of the city, superintendent of schools, members of the school board, representatives of the police and fire departments, and of course, officers of the National Safety Council, are present and give short talks. Playlets, pantomimes, moving-pictures, etc., are also parts of the program.

Playground Safety: We have organized in each of the supervised public playgrounds of the city a safety committee among the children. The supervisor acts as chairman of the committee. This is the third year this plan has been in operation and it has proved very effective in continuing the work conducted in the schools during the school year. We have on each playground a chart similar to the one used in the schools. On this playground safety rules are printed. Other instructions regarding safety off the playground are also printed on this chart. Spaces are provided for discs representing accidents that occur on each playground. This also is an extension of the school accident chart. We keep up continuous rounds of visits to these committees so that their interest is not permitted to lag.

Public Safety Bulletins: We have made arrangements whereby we are now posting 200 public safety bulletins each month in various prominent places throughout the city. These are changed every two weeks. These places include the City Hall, Court House, Police Headquarters, Auto Camping Grounds, prominent corners, and auto garages. We have been doing this about a year.

Co-operation of Other Agencies: We have had hearty cooperation on the part of the newspapers, Police Bureau, Fire Department, The Automobile Club, Garage Owners Association, and other similar organizations.

STATISTICS

The record of fatalities in Multnomah County, in which Portland is located, for the years 1919 and 1922, is given below:

	1919	1922
Total fatalities	179	125
Automobiles	42	37

Of the 37 automobile fatalities in 1922, seven were under 21 years of age.

This division of the National Safety Council was organized late in 1919, and did not really begin effective work until 1920. Hence, we may say that during the first three calendar years of its existence, 1920, 1921 and 1922, this Division was in large measure responsible for the reduction of 30 per cent in the number of fatal accidents. This, in view of what we all recognize to be a rapidly increasing hazard, and a post-war attitude of disregard of human life, is a record of which we feel justly proud.

School Children Statistics are:

	Dec. 1, 1920, to Sept. 1, 1922	June 15, 1922, to June 15, 1923
Traffic Accidents from slight to fatal.....	73	37
Fatalities	3	3

During the past year, we have had 156 meetings with school safety committees with a total attendance of approximately 3,500. We have held 90 assemblies of school children with a total attendance of approximately 49,000. We have conducted 54 playground meetings, with an attendance of approximately 10,000. Other meetings at which safety was presented from the viewpoint of public accident prevention reached an additional 2,500 people.

DELAWARE SAFETY COUNCIL

Whenever we speak of the Delaware Safety Council we at once associate with it the dominating personality of Lewis De Blois, who, I am sure all agree, has been very largely responsible for the splendid organization developed and the very creditable results obtained.

REPORT OF DELAWARE SAFETY COUNCIL

Safety instruction in the schools has been very effectively carried out under the supervision of Superintendent of Schools D. A. Ward, our Vice-president in charge of education. Instruction in safety subjects is now given in all the city schools and in many schools of the state. The school supervisors committee, consisting of eight instructors in local schools, has accomplished very good results. The members of this committee have met on an average of once a month and each supervisor has taken active charge of safety work in three or four schools. Dr. Payne's book on accident prevention has been supplied all schools and with the aid of this manual, bulletins, copies of the National Safety News and other publications supplied by the Council, safety instruction is being given in part of a period each week in every school of the city.

School safety officers were appointed and served at each school. The more competent boys were selected for this work by the principal and a designated teacher. The Safety Council provided each junior officer with an arm insignia which designated him as an official school safety officer. These officers went on duty at hours when children were either coming to school or were being dismissed. They assisted the smaller children across the street, kept them from playing in the streets, or hooking on to passing vehicles, supervised the play around the school, eliminated dangerous objects and conditions and in every way assisted in safeguarding the lives of school children. Two or more of the safety officers at each school were provided with hand signs, similar to railroad watchmen's "stop" signs which bear the inscription "Slow-School Zone." The boys were stationed a short distance away from the school on the curb and by raising the "Slow" sign warned approaching motorists of the presence of school children. This work has proved very effective in teaching the need of greater caution to all pupils. It gave the boys serving as safety officers an incentive for better school work and also gave them training in responsibility. The general public was favorably impressed with the work of the school safety officers, and with very few exceptions all auto drivers appreciated having their attention called to the school zone.

A mass meeting was held at the Queen Theatre, April 21, 1923, through the courtesy of the management of the theatre. Short safety talks were given by Superintendent Ward, Sergeant Hahn of the Police Department, and plans for using school safety officers were explained by the Council's secretary. The safety film "The A. B. C. of Safety," secured through the National Safety Council from the Detroit Board of Education was shown (this film was also shown at a school rally at Pennsgrove, N. J.).

General safety talks were given in all schools throughout the year by the secretary, assistant secretary and Sergeant Hahn of the Police Department. Talks explaining the plan for using school safety officers were given by the secretary in 10 schools and the junior officers were instructed in their duties at 15 schools.

Arrangements have been made to hold a final mass meeting Saturday, June 16, 1923, in the Queen Theatre. Certificates of merit signed by the Superintendent of Police, President of the Safety Council and the principals of the schools will be awarded the boys who have served favorably as School Safety Officers. Bronze medals will be awarded the Safety Officers who have performed their duties in the most meritorious manner. A safety playlet will be given by the pupils of No. 9 school at this meeting.

Demonstration Centers: In recognition of the excellent safety work accomplished in the local schools the National Safety Council has selected Wilmington in which to establish demonstration centers for safety work. Schools No. 2 and No. 9 have been chosen for these centers. The Educational Section of the National Safety Council has provided material and methods so that safety instruction can be made a part of the regular curriculum studies. The secretary of the Educational Section, Miss Mary N. Arrowsmith, visited Wilmington several times this year and has assisted in arranging for the work. When the safety instructions in the two centers are functioning properly, invitations will be sent throughout the state and surrounding districts inviting teachers to inspect the demonstration here. Arrangements have been made to exhibit samples of school safety work and the methods explained so that every visiting teacher may obtain the information necessary to incorporate safety instruction in all their curriculum studies.

Highway Essay Contest: We were again given entire supervision of the National Highway contest which is conducted annually by the National Highway Board of Education. A large amount of material explaining the purpose and rules of the contest were distributed throughout the state by us. The completed essays submitted by the school children and the safety lessons submitted by the teachers were judged by a committee of three appointed by this Council. L. A. DeBlois, vice-president of the Delaware Safety Council, George Heath, head of the Wilmington High School English Department and Charles Bush, principal of the Friends School judged the essays. Miss Dorothy Yearsley of Port Penn, Delaware, won the first prize, Evelyn Hahn of this city won second prize and Virginia Griffith of the Harrington, Delaware, public school won third prize. In addition to the state prizes awarded by the National Highway Education Board, this organization awarded five bronze medals. These were won

by Fred Francis, Claymont Public School, Frances A. Smith of Clayton Public School, Mina Hopkins of A. I. du Pont School and Frances Hay Hullihen, Newark Grammar School, Anna McGinnis of the Wilmington public schools. Miss Ethel Wilson, one of the teachers at No. 9 school, Wilmington, won first prize in the safety lesson contest. No state awards were given for the teachers' contest. However, Miss Wilson's lesson and the first prize essay were forwarded to Washington and entered in the National contest.

Continuation School: A series of Saturday morning safety talks were given in the Wilmington Continuation School this spring. The pupils of the continuation school are employed in local industries and attend this school every Saturday morning. Talks on general safety, automobile hazards, traffic dangers and safety in the home were given by representatives of the Council and Sergeant Hahn of the Wilmington Police Department. By this series we were enabled to reach a class of children not ordinarily reached by school safety activities.

Publicity: This report would not be complete without giving credit to the newspapers for the splendid, effective cooperation given the Safety Council. Practically every day of the year the local press carried safety articles and pictures. The newspapers gave liberal support to all school safety campaigns and every activity carried out by the Council. They prepared many safety articles themselves and wrote hundreds of strong editorials on accident prevention. As a majority of all accidents are public accidents and as the public is probably most effectively reached by the newspapers the value of the assistance rendered by the local press is evident. No exact record of this amount of publicity given the Safety Council throughout the year has been kept, but in recent months under the direction of J. B. Rumbf we have given about 500 column inches of space every month. Pictures have been used freely and cartoons which have made striking appeals to the public have been printed at various times.

TACOMA SAFETY COUNCIL

At this Congress we will hear mainly of the activities developed in the eastern and central sections of the country, and I am sure it will be interesting to hear from another Pacific Coast Council that has been doing things in truly western style.

Information obtained in Tacoma sets forth the following record for that city as to the number of traffic accidents for the past two years, in which children of school age were either killed or injured:

Year	Accidents	Fatalities
1921	53	6
1922	37	2

Upon inquiry as to whether the two fatalities for 1922 were automobile fatalities, this telegram was received from Tacoma:

"Your telegram this date regarding two street accidents last year one child was killed by automobile and the second while playing in street dashed suddenly in front of street car."

On the basis of the 1920 census, which gave a population of 96,965 to Tacoma, the one child killed in the automobile accident gives them a rate of 10.3 per million population. It is unfortunate that this information was not included in the statistics supplied to the National Safety Council, as it would seem that Portland is not the only city in the West that is setting an example to the country at large in how to protect the child.

Outlining briefly, it might be said that safety work in the Tacoma schools was started 10 years ago and sponsored by Colonel H. G. Winsor, a staunch supporter of the National Safety Council. At that time the program consisted of safety talks only, but the following year there was organized what is known as "The Tacoma School Safety Scouts."

At the close of the school year 1922-1923 there were issued 2,422 Safety Scout buttons to pupils of the 4th to the 8th grades inclusive. Of this number 435 earned scout commissions and 12 of them received prizes for the best essays or reports.

Nineteen of the 28 schools in Tacoma went 100 per cent this year, which means that every pupil from the 4th to the 8th grade inclusive in each of the 19 schools had qualified as Safety Scouts.

The Safety Scout Pledge of the Tacoma School Safety Scouts is as follows:

- I will work for the Safety of others as I would want them to work for my Safety.
- I will try to be careful all the time, everywhere.
- I will not take unnecessary chances of getting hurt, and will warn others against doing so.
- I will do my part to help reduce the number of accidents this year.
- All this I will do for the sake of humanity and the honor of my school.

This is a pledge that could well be taken by all, and it is interesting to note that the progressive Kansas City Council has just adopted this same pledge for the members of their Junior Safety Council—another tribute to the leadership of the Tacoma Council.

The Safety Scout Guide developed for the Tacoma School Safety Scouts can be obtained either through National Safety Council headquarters or from Colonel H. G. Winsor, direct.

It has come to be so generally recognized that the Boy Scouts of America is one of the greatest agencies for Safety in this country today, that it is not necessary to more than mention the fact in closing this paper on How Safety Activities for Children Reduce Accidents. Scouting prevents accidents by teaching the Scout to think, then act. What greater precept is there than this?

Here's to the Safe Scout!

"Keen clean face of the embryo man,
Above the kerchief that shows your clan;
Conquer the world as you will and can!
We dip the flag to your long, long file,
And the whimsical vim of your Boy Scout smile."

If it is ordained that the child shall lead us, then why not follow their lead?

DISCUSSION

Mr. Pond: I am from Minnesota. I understand Connecticut has laws licensing all drivers. If that is true, I should like to ask in what proportion of the examination does the matter of ordinances and laws of the state and city enter into the examination.

Mr. Stoeckel: The whole matter of licensing drivers is a state law. Every driver has to be licensed and the new driver has to be examined before he can be licensed, and has to pass an examination. The state law governs all management of automobiles in city and country districts, but there are certain phases not covered by state law covered by ordinances in the cities. Matters such as stopping alongside a fire hydrant, or things of that kind, hardly ever extend to the ordinances, but are covered by the actual driving directions in the law, and the examination is mainly into the personality of the men.

Mr. Pond: I should like to ask whether, when that law was enacted, there was any confusion in the original examinations of those who already operated cars.

Mr. Stoeckel: We didn't have examinations of those who were already operating cars; we started with those who came after the law was enacted.

Mr. J. P. Maloy (General Accident Insurance Co.): I would like to ask Mr. Dow if in his recording of accidents in New York City he has any information relative to the number of machines coming into New York for other parts of the country that are the cause of accidents?

Mr. Dow: The records do not show the proportion of accidents due to out-of-town vehicles. We do have a registration; approximately 100,000 come in from the outside.

Mr. Maloy: You have never tried to find out what part of the state they come from?

Mr. Dow: The greatest proportion of that number is from suburban districts around New York.

Mr. Maloy: It occurred to me that would be very valuable data. The Statistics might show that a great many accidents are caused by people going from rural districts to the cities.

Mr. Bradley (Milwaukee Electric Railway and Light Co., Milwaukee, Wis.): Mr. Stoeckel, among his recommendations, included the provision of some speed governor for automobiles. I wish to ask the comment of members present as to whether it would seem to be at all possible or

practicable to have a governor provided for automobiles to limit speed. Would it be possible to set it at say 35 miles, and would that prevent large numbers of accidents?

Major Havens (Grand Rapids): They use the governors on all their cars; they have about 30 automobiles now. They set that governor at 25 miles an hour. Of course, going down hill they cannot regulate speed by the governor, but they tell me that they are having fewer accidents since they put governors on their cars than they had before that time.

Mr. F. P. Walker (Detroit): Mr. Hanrahan of Chicago gave a paper in our session this morning that illustrates very clearly what can be done with governors on their trucks. I understand that in Chicago their trucks are governed down to a maximum of twelve miles an hour.

WEDNESDAY AFTERNOON SESSION

Chairman Van Schaack: We have been requested to ask the Nominating Committee to present its report first, in order that we may have the Chairman selected who will be able to attend the meeting of Chairmen tomorrow.

Mr. Anderson: Your nominating committee presents to you the name of the present chairman for reelection, Mr. David Van Schaack; for first vice-president, Mr. L. H. Palmer, general manager of the United Railways and Electric Company of Baltimore; for second vice-chairman Walter C. Boynton, director of publicity of the General Motors Corporation, Detroit; for the third vice-chairman, Mr. A. B. Wright, Buffalo, and for secretary, Julian Harvey.

Chairman Van Schaack: I would suggest that, as it is asking too much for a man to put his own nomination to a meeting, Mr. Anderson take the chair. Mr. Anderson took the chair.

Chairman Anderson: What is your pleasure?

(Motion made, seconded and carried that the nominations be closed.)

(Mr. Van Schaack took the chair.)

PUBLIC SAFETY FROM CITIZEN'S VIEWPOINT

A. S. GOLDSBOROUGH, MANAGER, MERCHANTS AND MANUFACTURERS' ASSOCIATION, BALTIMORE, MD.

There isn't any man in this country who gives to personal rights a stronger status than your humble servant; there is no man who believes more in the value of personal rights than your humble servant, but I have no patience with any man or with any woman or any combination of men and women that undertakes to preach the falacious doctrine that the item of personal right is the supreme possession of the American citizen.

If you and I went on the theory that personal right was to be the controlling and dominating influence with each and every one of us there wouldn't be anything in the way of restraint on the action of men, women and children. I merely allude to this that you and I at the very outset may understand that it is my belief that man has got to regard

the restraints of civil, social and religious influence in order that he may fit in to what you and I call the civilization of this modern time, and when I say "civilization" I don't mean the educational phase of mental development, but that great complex machine that you and I fit into every moment, and which you and I know from our observation and experience is getting more complex every day.

When I talk to you about the attitude of the citizen I am here to make the statement that every citizen has the right to demand safety, it matters not where we go.

Why, it is appalling, if we leave our own home and have no sense of security after we have left it in fear that if any of our family, our children or those who are dear to us, wander beyond the security of their own premises, it is impossible to tell what is going to happen! Yet, you and I are face to face with that situation every day, because the accidents we are piling up as the results of indifference and neglect are becoming so manifold, the world itself is beginning to stand aghast when it reads the statistics.

I sat this morning in one of the sectional meetings of the taxicab companies, and I was appalled to hear a man there say that the probabilities were that in Chicago this year there would be nearly 1,000 killed by the automobile.

If you and I were to learn on the morrow that an epidemic had attacked a certain city in this country and had swept into eternity 1,000 souls there, 24 hours wouldn't pass before all the public opinion and power and force of men and women in action would demand the municipal authorities to enact laws that would hold in check the possibilities of a repetition of that thing.

Down in Galveston many years ago the city was overwhelmed by a tidal wave. Everybody knew that it was serious, that it was tragic, that it was murderous in its effect and instantly there came into the brains of everybody there ways of preventing the repetition of that particular experience, and Galveston got busy and built bulwarks that stand like fortresses between them and danger.

The reason I call attention to that is, my friends, because I think you and I might understand we are face to face with a crusade that is no longer a fantasy of somebody's brain, but you and I are playing with blood; you and I are playing with life; and you and I are certainly playing with possibility of mutilation and mangle, unless we perform our part and unless we are conscious of the fact that there is an incumbent duty on each and every one of us I can hardly feel the crusade can make its proper progress. We play with danger so intimately that we hardly realize it. The tragedy of it!

FAMILIARITY WITH DANGER BREEDS CONTEMPT

Let me give you an illustration. You take a little child about ten or twelve years of age who has been accustomed to living in the rural sections surrounding a city, take it into the vicinity of the railroads, where there is a complex network of the railroads and the puffing of the locomotive

is heard every minute and all the activities of that kind of life are portrayed, and attempt to take that little one's hand and lead it across the track. Instinctively, the child will hold back and will repell the idea of your leading it into a network of danger like that. It is not a subconscious but a visual demonstration that along those tracks are running machines that might mangle its bones if it made a misstep.

You take a child that plays in and around those tracks every day. To that child the locomotive and moving cars means nothing. They play hide and seek around the freight cars. They do this for the simple reason that they are utterly familiar with the situation day after day, and it robs the child of the sensitiveness or consciousness whereby it believes there is real danger there.

Let me give you another illustration, but somewhat far-fetched. Have you ever watched a child play with a lion's cub? I have. I have seen it fondle it as it would a kitten, the two rolling around the floor playing together. I have seen a child with its face illuminated with the joy of being with this animal that seemed harmless to it, and as the years rolled by and the cub became the strong king of the forest nobody ever dreamed that there might be danger there, particularly for the child, because the child was reared with the hazard. Yet when one would least expect it some little thing would anger and arouse the lion force and, before anybody was aware, the strong jaw of the king of beasts would crush the bones of the little child.

Now, my friends, these examples may seem to you extreme, but the fault that I have to find with the average citizen is that you and I play with these same lions every day, and because of our familiarity with them, because of the fact that we come in touch with them almost every moment, because of the fact that we see them and they do us personally no harm we delude ourselves into the belief that there is no possible hazard to be found there. And yet, what do the statistics tell us?

People trust to luck! What do you mean by that? Simply because you go out of your house 364 days in the year and nothing happens you come to the conclusion that you are immune from danger, that some guardian angel you don't see with your eye, is holding the wing of protection over your head so that you can move along absolutely conscious of perfect security; while you are thus deluding and congratulating yourself upon a sense of this kind some careless man in the sixth story of the building beneath which you are walking knocks from the window some kind of commodity that strikes your head and crushes your brain, and there is no reason why it should ever have happened, no reason why your life should have been snuffed out. There is no reason why your consciousness and security should have been a real security, but it was not, because somebody was not thinking.

VIGILANCE IS OUR SAFEGUARD

There is only one kind of luck you and I can depend on so far as my limited observance as an average citizen would declare; the one thing I have reference to is the much used and abused word "vigilance," wide

awake observation of everything that is going on, and feeling, each man and each woman, for himself and herself, that each is definitely responsible for everything that happens.

Have you ever stopped to think, my friends, that if every man and woman was careful as to how, we could reduce the matter of accidents almost to zero. Take this crowd here, for example. If every man and woman in this particular assemblage during the remainder of his or her days should so conduct himself that neither by act nor neglect, so plan his life that not a single force would be put into play to cause damage to somebody else, think of the supreme knowledge of joy that would come to all of us under a consciousness of that kind. That is just exactly the character of the campaign that is needed, that we should place first upon ourselves, and when we are conscious of the fact that we have converted the individual ego, or unit, into a dependable security watching human being, then he can spread his influence to the next human beings with whom he comes in contact and by geometrical progress of spreading out like a fire, it grows larger and larger and larger until the great impact of an impulse like that goes infinitely further than you or I dare for a moment to dream of.

Every unvigilant, negligent, careless man handling any instrumentality or any commodity which, by negligent handling may mangle, may destroy another human being is an incipient criminal and we must talk about this in plain English, because the mere matter of pussy-footing on anything that involves the safety of life and limb or the joys of physical existence is absolute cowardice on the part of us all. I don't believe half as much in incriminating, punishing, locking behind the prison bars the man who is negligent and indifferent in causing death and damage as I do in the policy of prevention, because one damage prevented is worth fifty lockings of a criminal behind the bars.

The greatest general is not the man who is greatest in offensive warfare; history tells us that the greatest generals are the men of defense, the men who can place themselves and their armies between hazard and the people depending upon them, and so when it comes to all of the multiplied perils that surround you and me every day, and we begin to think about the seriousness of it all and understand it is getting worse by the minute instead of better by the minute, it is a definite lesson that the time has come when you and I as an obligation have got to find the ways of prevention and move the forces that form an obstacle between danger and those whom we love or respect.

I know some people say, "Goldborough, when any man makes a statement of that kind he is presenting a difficult problem," but God pity the man who has not the nerve to act when he sees the difficulty face to face. The difference between the man of red blood and real vigor and the pusillanimous type is the man who when difficulty presents itself, draws himself up like a man and asks for the opportunity to act.

If the Safety Movement has a meaning that you and I believe men and women should be guided by, then I am here to make the further statement as a citizen that some instrumentality must be utilized in order to accomplish that.

MOULDING PUBLIC OPINION

Public opinion is the great thing. No individual can arouse it alone. What is needed is some strong, persistent, subterranean force working on the minds and consciousnesses and selfishnesses so as to consolidate men into a resolution that they will work, work and work, until public opinion ripens into that situation where it won't stand for any condition such as the one we are confronted with.

It is a mere matter of the mental attitude of the public. You and I may organize these bodies all we please. I think the National Safety Council and all its coordinate parts is absolutely indispensable to the work in this country. There is no need to say otherwise, because it is in harmony with what I said a moment ago. It is one potential factor stimulating and stirring and rousing and flaming public opinion so that it has a definite view and a definite purpose.

Just one more word by way of illustration, and I have finished. I have great faith in sentiment. I believe anything can be accomplished if we feel right. I think anything is in the grasp of achievement, the mind and the heart working in unison.

You don't need anything better than what you can draw from the events of the late war to show what I mean. Go with me just a moment to the fields of Verdun. You remember the tragic moment! You remember when it seemed as if the last hope of the world was there about to be crushed! You remember how the ponderous hammer of the adversary was striking the lines of the allies every minute until it seemed as if by virtue of those strokes the line would be penetrated and Paris captured and the whole hope of the allies gone? Do you know how the adversary poured out gases that seemed to come from the mouth of hell itself, hoping that, by overcoming the foe, matters could be brought to a crisis? Not a matter of reinforcement! Not a matter of more artillery! Not a matter of more shot and shell! Not a matter of multiplication of the materialistic weapons and instrumentalities, but down in the trenches one of the men started to say to himself, "They shall not pass," and it was caught up, "They shall not pass," and then it spread from company to regiment, "They shall not pass," and then it spread from corps to corps and from division until the boys on the English Channel and the boys in the Adriatic were singing in unison with the French, "They shall not pass!" Exaltation that seemed to petrify the bodies and make of each human unit something solid as rock of the earth itself, and you could not budge them! You could strike with a hammer, pour your sulphurous gases out, use all the forces you pleased, but something in the mind had taken possession of the men that had made them more than men, because they *felt*, not simply heard the command, "They shall not pass."

Oh, what a glorious motto for us engaged in this very crusade around us! You men will find it in your work; you will find differences, scoffings, discouragements, laughings, all kinds of people who will try to betrifle your cause, but behind that barrage are all these multitudinous mangleings and mutilations, the forces of danger. Are we going to stand by idly because someone laughs, and let them come? Are we going to stand by and let them break through our lines, and the civilization of our land become one of blood instead of safety? I am here to say that the motto for you and me, men working with the National Safety Council and the citizens who are cooperating with them, is that these dangers must not pass.

If you men do your duty, if other citizens do their duty, and we all do our duty and live like men and fight like men the day is coming when instead of a thousand deaths from one death-dealing instrumentality alone in Chicago we will find the thousand reduced to such a small number that the world will say that that army of safety workers is entitled to the gratitude of the American people and the whole world.

Chairman Van Schaack: I find it necessary for me to ask your toleration. I must absent myself from this meeting; I have another engagement which makes it necessary to turn the chair over to someone else, and with your permission I will ask Mr. Remmers of St. Louis to conduct the meeting from now on.

(Mr. Remmers took the chair.)

METHODS OF STUDY OF TRAFFIC MOVEMENT IN RELATION TO TRAFFIC ACCIDENT PREVENTION

G. G. KELCEY, MANAGER, TRAFFIC ENGINEERING DIVISION, AMERICAN GAS ACCUMULATOR COMPANY, ELIZABETH, N. J.

The traffic problem is too complex to be solved by a few formulas or generalizations, based on half information. No one can say how the traffic situation in any locality is to be treated unless, with a few basic principles in mind, he clearly studies it and gets down to rock bottom facts. Organize the facts and they will suggest their own best remedies. Find the cause and treat it, and the effect—the traffic conditions which trouble us—will be relieved.

Getting basic facts involves such a mass of detail and there are so many variables to bring into line that few municipal officials have attempted a thorough investigation of traffic conditions. On the other hand, officials are always hampered by obstacles arising out of legal, financial, commercial and political conditions against which they feel helpless. Since these obstacles can only be overcome by an adequate and complete presentation of the facts and a definite and convincing plan of action, it is essential to make such a study and present the facts to the public.

From every standpoint traffic is an administrative and not just a departmental problem. Its treatment calls for the coordinated activity of almost all municipal departments. The purpose of this paper is not to outline the scope of extensive traffic surveys which are the work of experienced

investigators with ample funds and time. It is intended rather to suggest avenues of investigation which can be studied by any municipality and which will lead to the development of a plan of action which will take advantage of every existing opportunity to improve traffic conditions with the least expense.

For convenience the discussion is divided into two parts, the first of which is Traffic Movement and the second, Traffic Accidents.

TRAFFIC MOVEMENT

Traffic Artery Map. Main traffic arteries connect the heart of a city with its entrances and drain adjacent areas. Concentrate traffic through definite channels and the problem of control is simplified and accident conditions are greatly improved.

Select a large city map and block out areas which are sources of or receive large volumes of traffic. Traffic flow is between such areas and into and out of a city. Show clearly each congested area and all traffic bottle necks or heavily congested points.

Mark main traffic arteries on the map in color. With a second color trace heavily traveled secondary streets or connecting links. If the city is well planned the map will now show all areas adequately linked up by traffic channels which afford easy passage with least interference. Mark out with a third color desirable routings not at present available, but which can be used if improved.

Congestion in most cities is due to inefficient use of street area rather than to the lack of it. The business section of nearly all cities is used as the distributing point by traffic enroute to all sections. This traffic should be routed around because it interferes with the more necessary use of business streets.

As an example, one city was found to have little used streets which, when linked up, served to carry about 10,000 vehicles a day between two areas in twenty minutes less time with great relief to the business area through which these vehicles formerly passed.

The City Plan Committee of Buffalo is planning a circuit traffic boulevard around its business area that merits consideration by all municipalities. The cost of tearing down buildings and other expense for this improvement in Buffalo will be great, but it will be nothing to the cost of present conditions which the improvement will correct.

To by-pass traffic by routing is merely to distribute the peak of the load of heavily traveled streets over less used, but convenient routes. The question of routing is so important that it justifies exhaustive study to determine what conditions require it and how it should be done. One slow moving truck holds up a long line of vehicles. Truck and other slow vehicle movement should be studied and routings provided which will be convenient and yet leave other routes clear for faster vehicles. It is impossible to mention all methods and possibilities of routing in a paper of this length. If the suggestions outlined above are carried to this point, careful study of the traffic movement will show what additional routings can or need be arranged.

Without accurate and effective directional information any system of routing will be useless. Complete directional information, properly placed, is a courtesy to visitors and a means of breaking down established habits of local motorists to the end that they will take routings by which they can reach their destinations most quickly even though they may not always go by the shortest distance.

As a traffic survey develops it will be found that some streets selected for a main flow of traffic are not in proper condition or that short connecting links have to be cut through. If funds are not immediately available, such streets should be given preference in the regular paving program because of their importance in the plan. With the traffic movement map developed to this point it is now possible to consider how traffic movement may be further aided.

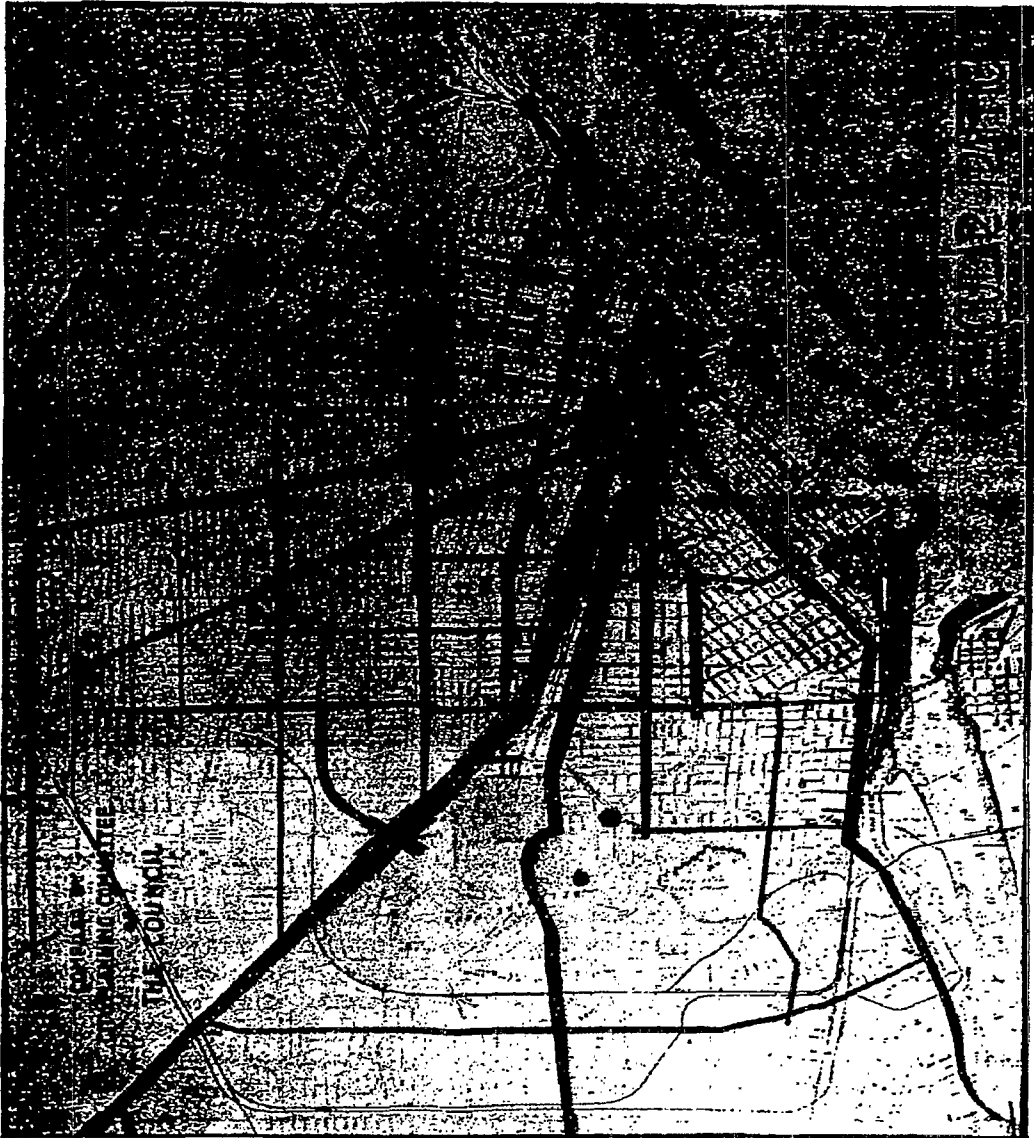
Right-of-Way Stop Plan for Main Arteries. In Chicago the right-of-way or boulevard stop has been in successful operation along the boulevards which checkerboard all portions of the city. All side street vehicles are required to come to a full stop before entering or crossing a boulevard. With right-of-way for main traffic, vehicles can reach distant points at a high average rate of speed.

Side street traffic is rarely delayed more than a moment. This it quickly makes up because of the uninterrupted ease with which it can then proceed to its destination.

A tremendous flow of traffic passes over these Chicago boulevards at an average speed of about thirty miles an hour and there are remarkably few accidents. Traffic safety may be illustrated by automobile accident insurance rates, which for 1922 in Chicago were approximately 60 per cent lower than in New York and about 40 per cent less than in Buffalo, yet the traffic in Chicago is very dense and there are many difficult conditions to contend with.

Block System. Great interest has been manifested in the Fifth Avenue, New York, block system, by which all north and south traffic is halted to permit the movement of all east and west traffic, and vice versa. This system is good where it can be applied, but it does not always fit. If conditions are right, a simple test of the plan can be made. Install an inexpensive system of bells or buzzers along the street to be tested so that an officer at a central point can give an indication of one ring for movement in one direction and two rings for traffic movement in the other to all officers on duty along the main artery under consideration. This test meets all the requirements without the rigidity of a more complicated system of signalling and in many cases can be indefinitely continued with complete satisfaction.

One-Way Streets. One-way streets, well worked out, are an excellent solution for many congested traffic conditions. A study of traffic conditions should show where congestion or narrow width of streets require one-way traffic. One principle which should be followed is that each one-way street should have an adjacent one-way street to carry traffic in the opposite direction; that is, each must balance the other and one-way streets as a system ought to produce a rotary movement of traffic.



One-way streets are, in the beginning, frequently subject to a great deal of criticism. For this reason it is absolutely necessary to be right and to defend the plan so that it remains in operation for at least a year. At the end of this period, if it is right, those who criticized in the beginning will oppose reversion to the old two-way traffic plan.

Safety Zones. Without safety zones, vehicles may not pass a stopped street car except under conditions of street width which are rare. They

may, however, pass a car stopped at a safety zone. One has only to watch a line of vehicles unable to get by a street car to realize the congesting influence of stopping traffic at each car stop. Safety zones materially speed up traffic movement. Careful study of traffic conditions will indicate where such safety zones are necessary.

Parking. It is obvious that, when street storage of vehicles interferes with traffic movement, vehicles in transit have the superior right. Our streets must not be garages. The cost of street space and interference with business frequently exceeds the cost of drastic measures to eliminate parking. In many cities storage areas in vacant lots or buildings must be developed even though great expense is involved.

The first step in solving the parking problem is to eliminate from congested streets, vehicles of the half or all-day parking variety. Many cities have reduced parking on congested streets to twenty minutes or one-half hour, and some of them have eliminated parking altogether from such streets.

Street Cars. Street cars must interrupt vehicular traffic as little as possible. As a means of speeding up the movement of street cars, the skip-stop plan, put into effect in Buffalo some years ago, is interesting. Cars outside of the business district stop at every other corner on the outward trip. Incoming cars stop at corners skipped outbound. This has materially improved vehicular movement.

The outskirts plan of fare collection is also an aid to traffic movement. By this plan the passenger pays his fare getting on on the inbound trip and getting off on the outbound trip. This permits cars in the congested area to load and unload quickly at both entrances and makes fare collections a matter of a few passengers at a time as they get on or off at outlying points. In some cities the time of street cars through the business area has been improved from 30 to 50 per cent by this method of fare collection.

A careful study will frequently indicate street car stops which can be eliminated and which unnecessarily hold up traffic in congested areas. The matter of street car routings is a whole study in itself. Such routings are often inefficient and study frequently brings out great relief to traffic movement by street car reroutings which also benefit street car service. The basis for study of street car movement should be a separate map which should show street car routings, directions, important stops and loading points, and switch backs. Improvements of the proper sort usually prove profitable both to the public and to the traction company. It is important to demonstrate such advantages to both sides.

Another important phase of the street car situation is the equalization of the load. Employment hours can often be arranged to spread the morning and evening peak over longer periods. Distribution of the peak load is to everyone's advantage and helps to reduce accidents.

Economic Aspects of Traffic Delays. The function of transportation is to carry goods and passengers from one point to another with greatest economy, dispatch and safety. The cost of bad traffic conditions always exceeds the cost of correcting them. One or two examples are given with

the thought that they may be useful in developing the economic considerations which must be presented if recommendations for improvement of traffic conditions are to be approved.

Trucks frequently cost their owners considerably in excess of \$3.00 for each hour of service. On the other hand, few vehicles with drivers have a value of less than \$1.00 an hour. The average certainly exceeds that amount. A vehicle delayed one minute a day represents a loss of six hours or at least \$6.00 a year. If the average vehicle loses ten minutes a day, which is usually low, the annual loss per year per vehicle is \$60.00. This amount is the interest at 6 per cent on \$1,000. In other words, the loss of one minute a day per vehicle justifies a capital expenditure of \$1,000 per vehicle for the correction of the conditions which caused the delay. If there are a thousand vehicles in operation, the justifiable expenditure is \$1,000,000.

There is another aspect to traffic delays and congestion. Each city has its trading or buying area and each large or small business district in a city has also a trading area. In the days of the horse and buggy, trading areas were small. With the automobile, trading areas expanded. Congestion is now contracting them. The result is that cities with least congestion are gaining commercial advantages and are absorbing other cities' customers because many people living between prefer a longer drive rather than suffer traffic inconveniences. Similarly, new business sections are growing up in the outskirts of cities because congested conditions of the downtown or business area. Congested area business men should approve rather than oppose traffic improvements. Congestion is an important factor in the volume of trade; it can stifle trade and it has already shown evidence of stifling the growth of some cities.

TRAFFIC ACCIDENTS

Traffic accidents are due to general conditions such as carelessness, lack of traffic discipline, and to conditions, local to troublesome points, which usually invite accidents.

It is obvious that the only way to correct accidents is to find out where they occur and what causes them. It is easy to find in cities that there have been accidents at certain points, but how many and what caused them is rarely recorded. Few cities can state the high points of their accident problem.

A few cities have accident pin maps upon which are shown, by various colored pins, where accidents occur, the type of accident and the degree of its seriousness. As a cluster of pins begins to develop, it immediately shows up and is the basis for prompt and effective remedial action. Such cities start a new pin map each year and the old ones are held intact for reference. This tack record should be on a very large wall map of the city. For the correction of accidents there is hardly anything else that is quite so important as this pin map picture, which any city can maintain at practically no expense or trouble.

As a basis for a preliminary study of accident conditions, it is suggested that a complete tabulation of accidents of various types be made

for a year. Select a large map of the city and, by means of a dot or pin for each accident, spot the information. Accident concentrations will immediately show up.

To illustrate accident concentrations, it has been found that in one city of 600,000 almost 30 per cent of all serious accidents on record concentrated at 87 points, and in another approaching a million in population 28 per cent of all recorded accidents were at 64 points, and in another of 100,000, 46 per cent of all accidents were at 57 points. Such information points the way to definite and effective action.

HOW INTERSECTIONS FIGURE IN ACCIDENTS

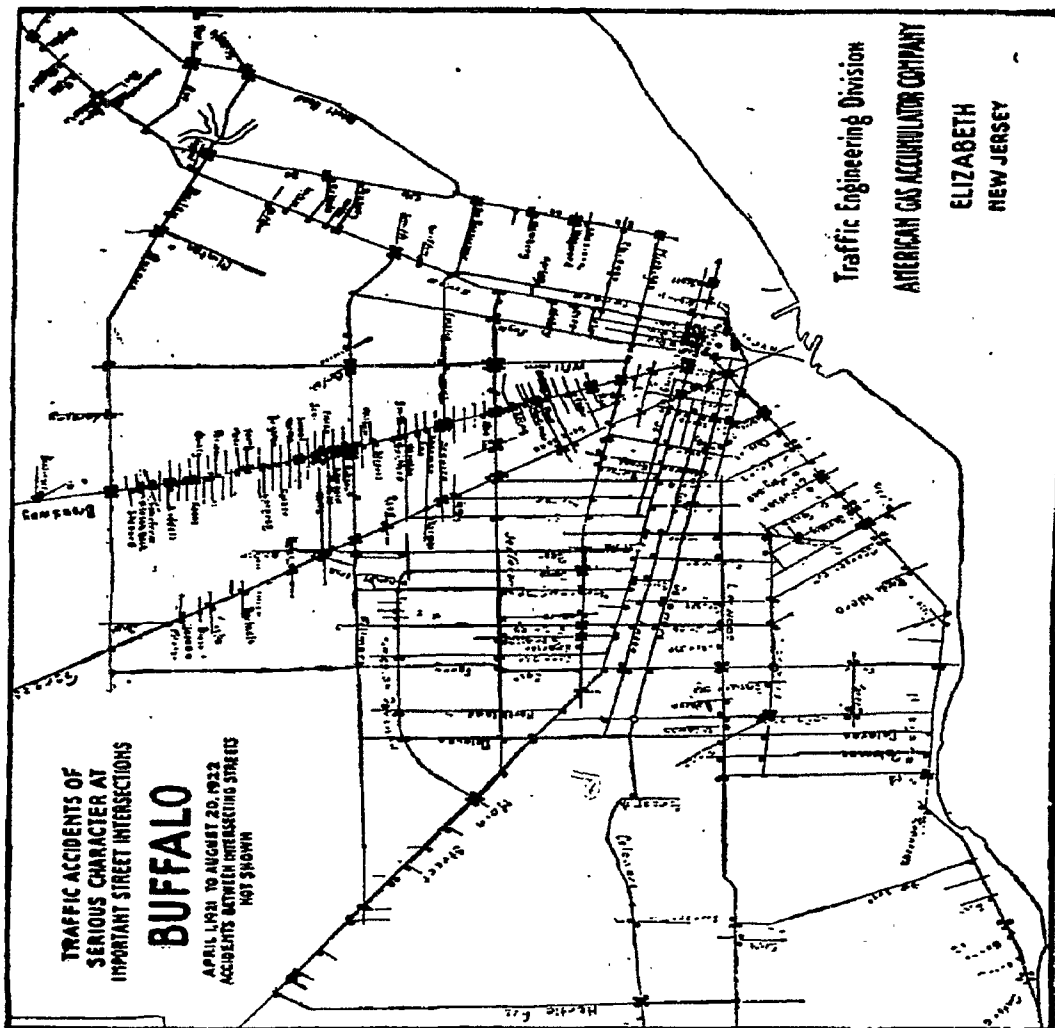
It is impossible to go into all of the causes of accidents and their treatment. However, a major portion of the accident problem is at street intersections and it may be interesting to state a few of the facts involved. From 85 to 90 per cent of all accidents usually occur outside of congested districts and approximately 70 per cent of all accidents will be found at street intersections. It is obvious that the major problem of accidents is at street intersections in the areas outside of the business section.

Close observation shows that approximately 68 per cent of traffic in eastern cities turns from one street into another inside or to the left of the center of the intersection. This illustrates the rule that traffic can be counted upon to follow lines of least resistance in spite of all regulations to the contrary. At street intersections a short left-hand turn, which can be made without reducing speed, is a course of least resistance which the greater part of traffic follows. Such traffic gets on the wrong side of two streets and unexpectedly intersects all other traffic and pedestrians at an acute and dangerous angle. When traffic intersects at right angles accidents rarely occur. This is clearly demonstrated by accompanying illustrations.

Street intersection accidents can be almost entirely eliminated by properly placed obstructions which block out lines of least resistance which are wrong and which will establish low resistance paths which make the proper course the only convenient one. In other words, make the line of least resistance the right thing to do and most traffic problems can be automatically solved. Obstructions used for the correction of traffic problems must be signalized; the important point to bear in mind, however, is that an obstruction and signal are both necessary if the work is to be properly done without an officer constantly in attendance.

Another element which produces accidents is low visibility, due to projecting buildings or objects at points of traffic hazard. Bad curves, grades, railroad crossings and frequently, also, the type of pavement, all claim their toll of accidents. Pavement which gets slippery in wet weather, for example, should never be used on grades.

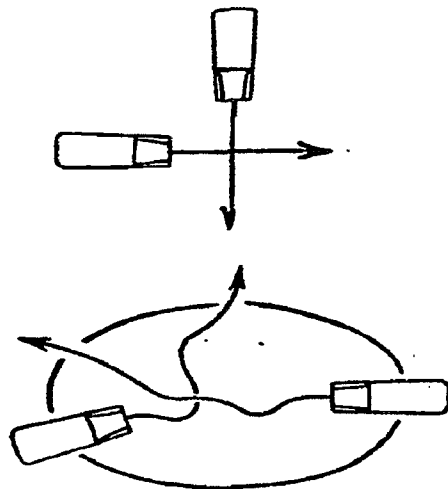
Safety zones are necessary in business or congested areas for the convenience of street car passengers. They are also necessary where it is found that accidents occur due to lack of safety zone protection. Such places are usually at heavy transfer points.



An investigation of this sort will indicate a regrettable lack of accident information. In conjunction with a pin map and a study, such as the one suggested above, there is nothing so important as good accident data. To secure this, the report of accidents should be compulsory and the preliminary report, either by the motorist or by a patrolman, should be the basis for a thorough investigation of each accident by a special man or men who are trained for the purpose. Such information should be organized and studied so that the causes and concentrations of accidents may be determined and eliminated as they develop.

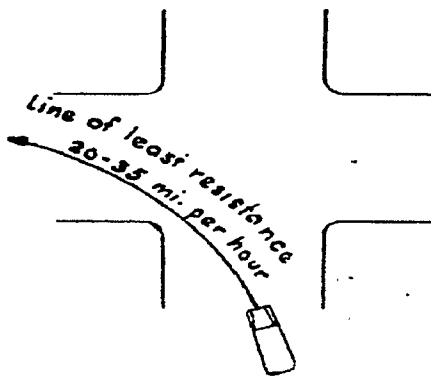
CHART VIII

A TRAFFIC PRINCIPLE



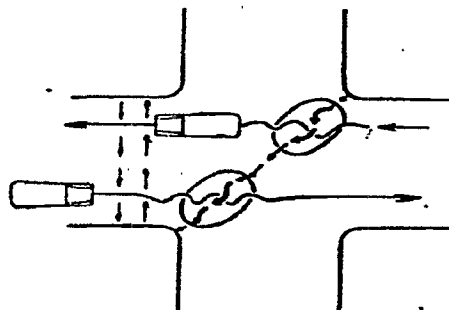
If traffic meets at a right angle there is no confusion. If it intersects at an acute angle, the confusion area multiplies as the angle and speed increase.

PATHS OF LEAST RESISTANCE



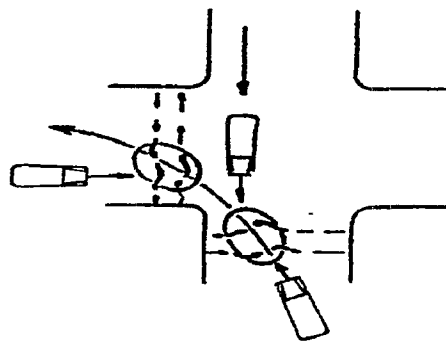
About 68 per cent of traffic follows this shortest and easiest course despite all contrary regulations. Note vehicle moves fast and on wrong side of two streets.

ILLUSTRATING THE PRINCIPLE



This principle is illustrated by the safety of those who use the normal cross walk and those who cross traffic diagonally.

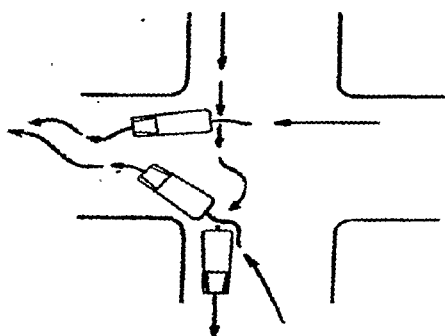
EFFECT ON PEDESTRIANS



Pedestrians, looking for vehicles in opposite directions, might as well cross corner diagonally. This condition grows worse if view is cut off by buildings.

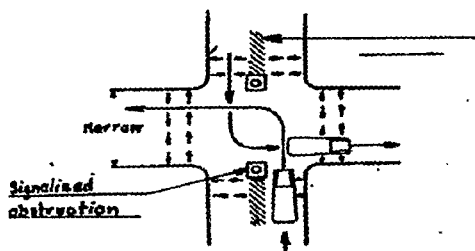
CHART VIII—Continued

EFFECT ON OTHER VEHICLES



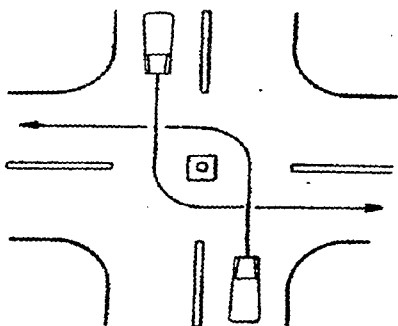
Note confusion caused by speed and unexpected intersection with other cars. Dangerous eddy currents extend considerable distance beyond intersection.

TREATMENT OF NARROW OR CAR TRACK STREETS



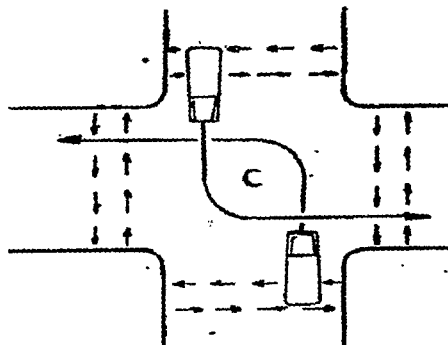
In traffic signaling, obstructions must be used to definitely block wrong paths. The signal must effectively mark the obstruction and have strong moral value on traffic.

SPECIAL TREATMENT FOR WIDE STREETS



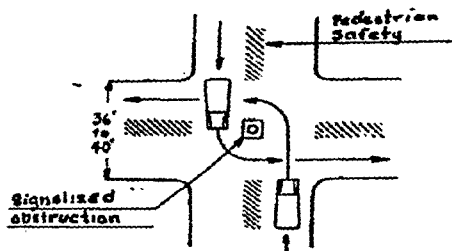
With enough room, traffic will turn left of center obstruction. Wrong turn would be blocked out if there were center curbing, as shown. This is usually impractical, so—

RIGHT ANGLE-CONTROL SPEED



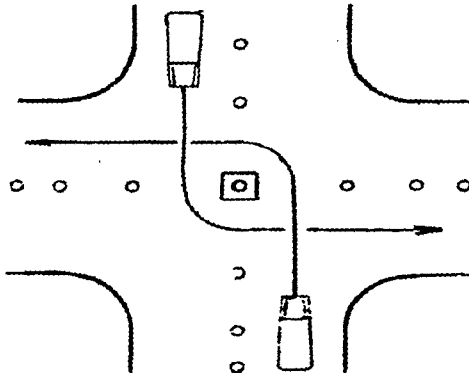
If all vehicles turn around center, traffic intersects at right angles and under control. Note right angle at cross walks. Accidents rarely occur under these conditions.

WIDER STREETS PERMIT CENTER INSTALLATIONS



Signalized obstructions must be designed so that traffic cannot disregard or pass over them. They must make the right path easiest to follow and wrong paths difficult.

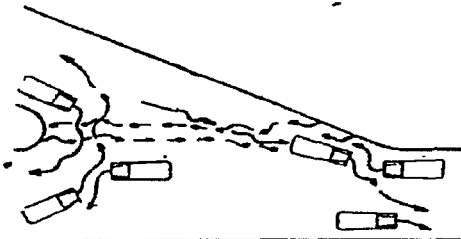
BLOCK OUT PATHS THAT ARE WRONG



Use low iron markers painted white as an aid to keep traffic in proper paths. White lines are useful, but not as effective as markers.

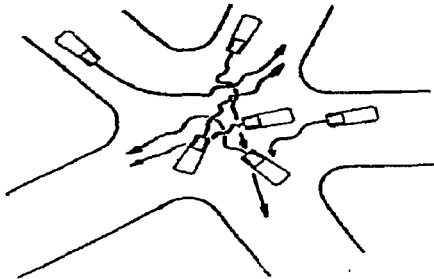
CHART VIII—Continued

ACUTE ANGLE STREETS DANGEROUS



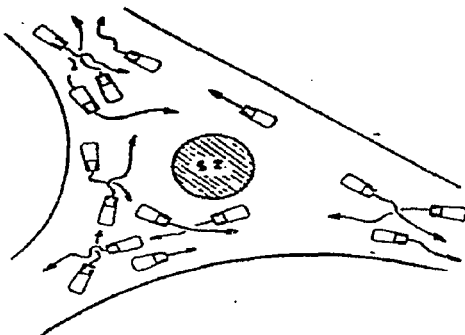
Traffic always takes the shortest cut across an area. Wide flare of acute angle streets is particularly dangerous to pedestrians.

REGULAR INTERSECTIONS



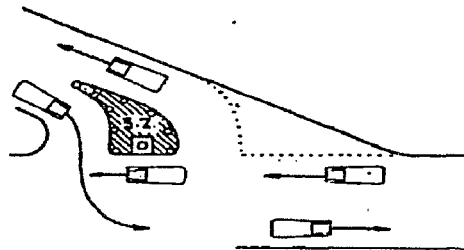
When several vehicles take short cuts at the same time, accidents are frequent. Conditions shown above invite accidents.

TRAFFIC DISORDER



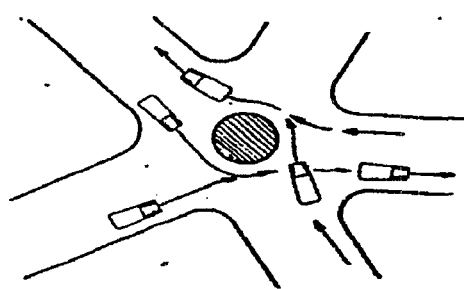
It took four officers to handle this situation. Accidents were frequent and there was much congestion.

CREATE SAFETY AREAS



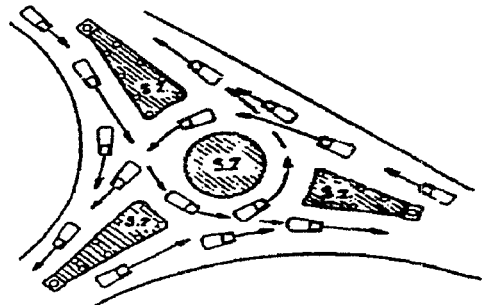
Traffic can be channelized and made orderly if proper areas are marked out or curbed. Two methods of treatment shown, one cross-hatched and one dotted.

CIRCULAR TRAFFIC



Circular traffic, where it applies, is the right solution. Rotary movement is the traffic ideal.

TRAFFIC ORDER



Traffic organized, four men removed 2½ years ago. Accidents and congestion were eliminated. Right paths were made the easiest.

Accidents at street car stops involve a triangle of circumstances. When a street car slows down, motorists behind rush to get ahead to avoid delay. This coincides with the effort of pedestrians to signal and to reach a street car. During hours of darkness and even in daylight, the danger to pedestrians under such circumstances is obvious.

Traffic Discipline. Traffic discipline is the necessary respect for the rights of others and for traffic regulations. It develops as a result of impartial and strict enforcement of regulations which are simple, reasonable and just. Traffic discipline in any city reflects the quality of all who have to do with it. There are few factors in the solution of the traffic problem so important as discipline and few so hard to accomplish.

Safety Education. There is no more essential work in the solution of the traffic problem than that of education of the motorists, of the pedestrian public, and most important, of school children. This subject has been exhaustively gone into and there are a number of excellent treatments of the traffic and safety educational movement. These are referred to in the bibliography at the end of this article.

The Cost of Traffic Accidents. Figures given out in 1921, and since confirmed by various investigators, place the average loss per person in the United States at approximately \$15.00, or \$1,500,000 for each 100,000 of population. Recent reports from England indicate a similar loss to the population of London.

All cities can secure lower insurance rates by reducing accidents. One city which has been investigated can, by the correction of less than 30 per cent in accident conditions, and this is within easy reach, reduce insurance rates so that there will be an annual saving in insurance premiums of over \$30.00 each, or of \$2,207,000 to its 60,000 motorists.

The cost of traffic accidents is briefly reviewed above with the thought of establishing an annual cost which each member of the population must bear. The average cost per individual in the United States is undoubtedly in excess of \$15.00, and this represents six per cent on \$250.00. All cities could, therefore, expend \$250.00 for each individual for the correction of accidents, assuming that such accidents could be reduced 100 per cent. If only a 30 per cent reduction is secured, then \$80.00 is the justifiable expenditure.

Cost of Handling the Problem. From work which has been done so far in the development of engineering treatment of traffic conditions and properly installed signal systems, it is evident that traffic at most troublesome points can be handled mechanically in terms of twenty-four hours a day rather than during a single eight-hour shift. Men at \$1,600 to \$2,000 a year are too expensive to maintain at any point of traffic danger which can be as well handled mechanically. Men are necessary to maintain discipline and there are many points at which a man must be stationed.

The problem must be solved and it does not involve the use of less men so much as it does to avoid the addition of many more. Present forces are adequate to handle the situation and to maintain the necessary traffic discipline.

The cost of mechanical correction is one-tenth to one-twentieth the cost of additional men. An officer prevents all accidents at a point during his eight hours of duty. At least 50 per cent of all accidents occur during the other sixteen hours. On this basis, mechanical correction, which can certainly average 75 per cent twenty-four hour improvement, should be applied wherever it can be effectively used. This phase of the problem requires good engineering and proper signalling.

Business and Political Antagonisms and Jealousies. When anything new is done with a local traffic problem public attention is immediately focused upon it and, since traffic is one of those subjects upon which everyone has an opinion, it is important to do whatever is necessary to have everyone come to the same conclusion. The question of proper publicity, by which the public's ideas on traffic can be properly guided, is very important.

Little can be done with traffic without stepping on the toes of a business man, merchant or political group. Nothing should be attempted, therefore, which is not carefully studied and known to be right and once put into effect, it should have all the defense necessary to make it stick. A half-hearted attempt usually does serious harm. In many cities the only way to work effectively with the traffic problem is to organize a group of local business men who work with the city officials on the traffic problem. Of course, care must be exercised in the selection of this group and such a committee must have punch and power.

If possible, the best method of overcoming financial, commercial and other antagonisms is to make a complete survey and to present the subject in such a fashion that everyone's advantage overbalances small group or other antagonisms. One of the strongest things to be presented is to show the cost of conditions as they are and to establish that the losses which result so greatly exceed the cost of improvement that there is only one course to pursue and that is to correct the conditions.

In two municipalities within the last three months local groups interested in traffic have defeated in local elections their town administrations on the basis of inaction or adverse action to traffic improvements. The time is not very distant when one of the most important planks in any municipal program is going to be a program of improvement of local traffic conditions. The presentation of definite evidence of loss due to traffic conditions properly made compels action.

SOURCES OF INFORMATION

The following sources of information contain many valuable suggestions for traffic improvements:

"Unchoking Our Congested Streets," Robert H. Whitten, Advisor, Cleveland City Plan Commission, pamphlet No. 194, American City Magazine, Tribune Building, New York, N. Y.

"Speeding Up Traffic at Intersections," Herbert S. Swan, city planner, 15 Park Row, New York, N. Y., Engineering News Record, March 1, 1923.

"Our City Thoroughfares, Shall They Be Highways or Garages?" Herbert S. Swan, American City Magazine, December, 1922.

"Day and Night Storage and Parking of Motor Vehicles," Hugh E. Young, engineer, Chicago City Plan Commission, American City Magazine, July, 1923.

A series of articles on traffic: *"Traffic Engineering," "Traffic Engineering in Trenton,"* and *"Traffic Engineering in Buffalo,"* by G. G. Kelcey, Traffic Engineering Division; American Gas Accumulator Company, Elizabeth, New Jersey.

Proceedings of a Conference on Highway Traffic Regulation at Yale University, May, 1921, under the auspices of Highway and Highway Transport Committee, Washington, D. C.

"Facts and Figures on the Automobile Industry," National Automobile Chamber of Commerce, New York, N. Y.

Traffic data and reports, National Safety Council, Chicago.

"How Are Your Driving Manners," Motor Magazine, May, 1922.

Traffic Map of Downtown Boston, Parking Spaces and One-way Streets, Boston Evening Transcript.

"Adequate Parking Facilities," William P. Eno, Eno Foundation for Highway Traffic Regulation, Washington, D. C.

"Science of Highway Traffic Regulation," William P. Eno, Washington, D. C.

"Relation of Electric Railways to Traffic Regulation," W. H. Maltbie, Traffic Officers Journal, New York, June, 1922.

"Traffic Restriction and Segregation," Engineering and Contracting, Chicago, December, 1922.

Information on the success of one-way streets, Traffic Departments of Pittsburgh, Detroit, Philadelphia, New York.

A Bibliography on Education and Accident Prevention and other material, National Safety Council, Chicago.

A course of Study in Safety Education, Detroit Public Schools, Harriet E. Beard.

Public Education and School Safety, Safety Council, Chamber of Commerce, Rochester, New York.

Safety Instruction Manual for Cleveland Public Schools, Board of Education, Cleveland, Ohio.

The following magazines publish important articles on Traffic: *National Safety News*, Chicago; *American City Magazine*, New York City; *Traffic Officers Journal*, New York City; *Engineering News Record*, New York City, and *Engineering and Contracting*, Chicago.

REPORT OF MOTION PICTURE COMMITTEE

DAVID S. BEYER, CHAIRMAN, VICE-PRESIDENT AND CHIEF ENGINEER, LIBERTY MUTUAL INSURANCE COMPANY, BOSTON, MASS.

The Chairman of your Motion Picture Committee is pleased to be able to report real progress this year in the completion of the first safety film ever produced directly by the National Safety Council.

Because the novelty of the motion picture in safety work has a strong appeal, and because the impression seems to prevail that the National Safety Council has unlimited resources, there has been a very insistent demand from our members for new films.

The matter of supplying these films has not been a simple one, however, for the yearly dues that you pay to the Council are on a "service

at cost" basis, and before any additional features, such as the production of safety motion pictures can be undertaken, the funds must first be provided. To produce a good motion picture with a professional director and cast and standard studio effects, costs real money.

How your committee started a finance campaign for six pictures that first fell short, and how the committee then revised the plans and finally came through with a fund sufficient to begin the production of three films is a long story, and I shall not attempt to relate it in detail.

FILM COMPLETED IN SHORT TIME

On June 18, however, we received a telegram from headquarters saying the way was clear for the first film, which it was hoped could be ready for showing at the Buffalo Congress, October 1st.

We had already been in touch with a director of national reputation, and we engaged him at once and instructed him to hire the cast. He was able to sign up such talent as Stanley Walpole, Ruth Gale, Jimmy Ward and Madeline Ford. The scenario was thoroughly gone over, the studio was hired, property man, carpenters, electricians, boys and girls for the "mob scenes," etc., were employed, and actual shooting of the picture began on July 16th. Five weeks later, the film was given a preliminary showing before the executive committee of the Council, at Atlantic City. A number of changes were made following this showing, and the result is the completed film, "Ask Daddy," which is being given its first public exhibition at this Congress.

It is hoped that one or two additional films may be produced this fall or next spring, and that the sales and rentals of these films will bring in enough revenue to finance succeeding films, and so on "ad infinitum." A number of orders have already been placed with the Council for copies of the picture, and if you want a copy I would advise you to place your order promptly, while the negative is new and unworn.

Sale and rental prices for the film can be obtained from the Council headquarters in Chicago.

How a perfectly good auto robe was sacrificed in the cave scene to make a costume for the leading lady, who, as she first appeared, would have made a hit in the front row of the "Follies"; how the cave man wearing a wig, a beard, and a small piece of leopard skin was chased through the woods by our wolves; how Frank Morris played a part that ranged from chief turtle-catcher to the pompous-looking M.D. in the picture; these and similar incidents helped to lighten the long days of hard work.

As to the success of our labors, you can judge that for yourselves, if you will watch for the next showing of "Ask Daddy."

Mr. Bradley (Milwaukee): In viewing the picture last evening I was impressed with the possibilities of its use for starting off clubs which would continue and be effective with something more than merely a little flash in the pan, and the plan of Mr. McBrayne in using the A. B. C. button as a kind of reward for effective work appeals to me greatly.

SAFETY IN PLAYING THE PUBLIC'S NEW SCIENTIFIC GAME-RADIO

S. E. WHITING, CHAIRMAN, RADIO HAZARDS COMMITTEE, PUBLIC SAFETY
SECTION, NATIONAL SAFETY COUNCIL

The report of the committee has been published in the September issue of the *National Safety News*. We have decided that there isn't any very serious hazard in radio work. There is practically none in receiving set operation. There is some in receiving set installation, if you consider the erection of out-door antenna, but that hazard is almost obvious, yet needs a word of caution, because there have been eight to ten death cases from the installation of out-door antenna.

The use of the batteries has not been particularly hazardous but when you get into the charging of a battery by connecting it through transforming equipment to lighting circuits remember that when you are handling the regular lighting hazard that is not particularly harmless.

There are rules given in the draft of the code of the report for such installations, and also for out-door antennas, and those rules should be followed.

There is also a chance when you get up to rather elaborate sets where you use a battery that runs high in voltage perhaps over a hundred volts, that serious or fatal shocks might result.

I don't think you are particularly interested in the transmitting stations, although his report goes into them somewhat. It is quite a technical matter, and we can leave it to the expert putting in transmission sets.

The troubles I had at first in that work were due to the ignorance of the possibility of getting currents in neighboring electric circuits, but those hazards were more fire hazards than accident hazards.

This report should be credited not to the committee, but to the National Safety Council headquarters, and to Mr. Roseland who supervised that preparation. The committee itself merely O. K'd the matter, and the real work was done by National Safety Council itself. We wish to reprint the code in pamphlet form for distribution, and on that account we would like to get any criticisms or suggestions for alteration in the report before that reprinting is done.

FACTS ABOUT A COMMUNITY SAFETY ORGANIZ- ATION AND ITS WORK

C. M. TALBERT, PRESIDENT, ST. LOUIS SAFETY COUNCIL

The avowed purpose of a local Safety Council should be the prevention of accidental injury to every human being, either through the agency of himself or of others, within the geographical scope of the Council. From the very nature of the community in which a Council may be organized, its work divides itself quite naturally into two classes, namely, industrial and public safety. The problems of industrial safety are such as make their solution comparatively simple, and there has been, for some time, an established standard of principles and methods.

PUBLIC SAFETY WORK MORE COMPLEX

The matter of public safety is, however, more complex; has been studied and worked upon for a much shorter time and is yet probably far from an established standard. The matter has been much in the public press and mind and much theorizing has been done, with a tendency to do still more. For these reasons, it has seemed worth while to present, in as concrete form as possible, just what has been done by one local Council in the hope that it may serve as a guide to others, having in mind that reference is made principally to its work in public safety.

Without reciting the history of public safety work or enumerating the various phases through which it has progressed, it may be stated that the following have been proved true, viz:

That no business interests acting alone can do successful public safety work.

That no single organized body can do effective work outside of its own membership.

That no group of municipal officials working alone can do so.

That it must be by organized effort of representatives of business, commercial, industrial, civic, school, church, municipal and other active interests.

That a local safety council must establish itself in the eyes of the community and particularly in the minds of the newspapers as an unselfish, stable, permanent body.

That results must be achieved through education of the individual himself and all effort must be to this end of individual thought and care for himself and for all others with whom he may come in contact.

RELATION TO NATIONAL SAFETY COUNCIL

It is assumed, of course, that all local councils shall be chartered by the National Safety Council and shall conduct its affairs in conformity with its general principles. Without touching the details of the desirability or necessity of this connection, it may be stated that human experience has shown that humanitarian work of a general character must, to be successful, have some central, governing and directing body. The experience of the Red Cross, Y. M. C. A., Salvation Army and many others proves this.

However, the details of planning and carrying out the local work must of necessity be left to each unit as follows:

SCHEME OF ORGANIZATION

Placed in the order of their relative importance, the fundamentals of a Council would be:

1. Executive Organization
2. Financial Support
3. Working Committees

Consider in detail these present the following:

Executive Committee: This is the dominating unit; for, upon it, devolves the duty of determining all matters of policy, finance, methods, and, in fact, all activities of the council. It must consist of men and women who, for some reason, have an active interest in the work, who have such standing in the community as will reflect a credit upon the council, who fairly represent the different interests of the city, who have been at least moderately successful in their own business, and who will give the time necessary to study and understand the problems and to pass a fair judgment thereon. They should number at least twenty; should meet once a week; hear reports of all working Committees; discuss such matters as may be presented and be prepared and let the majority rule. There should be on the committee representatives of at least the following: organizations and interests that give financial support, municipal authorities, police, schools, churches, improvement associations, etc.

Executive Officers: These should be men, not only of sufficient ability to conduct the affairs of the council but of such standing in the city as to be a credit to it. No individual should be selected unless he can and will give of his time and energy so much as may be needed.

Secretary Manager and Staff: One of the very first facts developed in public safety work was that while the executive committee might devise a plan, yet the actual progress must be through some individual or individuals whose first and only duty is this work; in other words, that while it was absolutely necessary for non-paid individuals to act as executive committee members, it was equally necessary to have a salaried officer to see that the plans of the committee were carried out, thus was developed the Secretary Manager and subsequently his staff. The staff, as the council progresses, increases to include an Industrial Engineer, a Public Safety Engineer, a Membership Secretary, a Financial Secretary and necessary clerks and stenographers.

The successful secretary manager needs to be a careful selected individual; he should be a man of vision and enthusiasm,—a good talker, of presence sufficient to meet properly the man of affairs on his own ground and yet hard headed enough to conduct his own office in a business-like way, and particularly to keep clear of financial rocks.

The industrial engineer should be a practical mechanic and familiar with shop practice and operation. His duties are to canvass industries for membership, to visit plants of members and to give practical help in advancing safety therein.

The position of public safety engineer is rather difficult to fill, for it is he who must be the practical man, with considerable experience in the diversified problems of traffic, capable of compiling and analyzing statistics of accidents, suggesting remedies where bad conditions are shown, and capable of properly representing the council in traffic conferences of business and other interests.

Finances: The financial support of public safety work was one of the very early problems and one which of necessity must be solved if a Council

was ever to reach a point of stability and permanency. Without reciting the trials and stages of development, it may be stated that the following definite conclusions have been reached:

That to be even fairly successful, there must be a definite and dependable income.

That any attempt to provide this by a system of voluntary contributions, either through a small number of contributors of large sums, or a large number of contributors of small sums, or a combination of these two, while it might serve to help a temporary situation, was neither dependable nor desirable as a permanent system.

That the matters were of such universal concern that some scheme should be devised of presenting to each business and personal interest a request for a definite sum, based upon the logic of the work to be done, the manner of doing it, its cost in dollars and cents, the financial interest of the party in question and the proportional part that they should pay.

This was done in our case by preparing a budget showing just how funds were to be expended. Next, by tabulating the various interests to be approached, such as public utilities, commercial bodies, etc., and assigning to them their proportional part of this budget and requesting them to pay it into our treasury as their—not contribution—but proper proportional part of an investment for the reduction of public accidents. As proof that this can be done we cite that our largest St. Louis utility—the street car system—has been for four years, in the hands of a receiver appointed by the United States Court. The company was told that their proportional part was \$4,000 per year. To obtain this, the entire matter was presented in turn to their claim adjuster, the general manager for the receiver, the receiver himself, the referee appointed by the Court and finally to the federal judge, as well as to the attorneys representing the owners and bond holders. For three years, this appropriation has been annually approved by all those mentioned and paid to the council.

This type of membership has been designed as Class A and, in 1922, paid into the Council Treasury \$10,153.60. Class B is composed of business and professional men who voluntarily pay a \$10 fee for a membership certificate amounting in 1922 to \$4,017.50. Safe Drivers and Safe Pedestrian Clubs contributed \$4,592.00.

At the end of each year, a financial statement is prepared by a certified public accountant and a copy furnished to each Class A member and given such other publicity as may be possible.

COMMITTEES—EXECUTIVE, ADVISORY AND GENERAL

The first committee of the council and the one of final authority in all matters is the executive committee. As the interests of the St. Louis safety council developed, and an increasing number of matters were presented to the executive committee, it was found necessary to supplement this with others and to adopt a method of procedure that would conserve

the time of the executive committee and allow it to be concerned more with principles than with details. There developed first, the working committees, under each of which was to be carried on the active work assigned to it under the following provisions:

That the work of these Subordinate Committees should be outlined by the executive committee.

That the method of carrying on this work should be subject to the approval of the executive committee.

That matters presented to the executive committee and pertaining to any specific committee should be presented to and reported upon by the committee before any final action should be taken by the executive committee.

That details of matters within the province of a specific committee should be presented to such committee and should not be discussed at executive committee sessions. This for the purpose of conserving the time of the executive committee.

These general committees have reached the number of twenty, and a complete list of them and an outline of their duties is appended hereto. Some of the more important of these will be discussed further on.

Advisory Committee: As the council has, in the course of its development, assumed a more important place in the community, an increasing number of matters have been presented to it and more numerous requests have been made for its participation in affairs. For this-and for other reasons, it was deemed advisable to form an advisory committee, which would consider and report to the executive committee upon all matters affecting the policy and finances of the council. It was felt that this committee should be thoroughly conversant with the history, growth and purposes of the council, as well as its financial situation. Its membership was made up, therefore, of all past presidents, whose interests and council it was desired to retain, and its then existing executive officers.

General Committees: As stated, these are the results of a gradual development and did not always follow in logical sequence, some of the later ones being found to be of far greater importance than some of the first to be organized. They number, at the present time, about twenty, and it is altogether likely that some of them will be discontinued and their work merged into others. Too many committees may easily present too complex a system. These relations of these to the executive committee has been partially noted. Their further relations are as follows:

The chairman is ex-officio a member of the executive committee. They must submit their general scheme of work to the executive committee for approval and must receive such approval before putting them into practice.

Matters within the scope of any committee must be referred to it and in turn, must report to the executive committee with a recommendation thereon before final action may be taken by the executive committee.

No committee may exceed its budget without a further appropriation by the executive committee.

The principal working committees are: Membership, Finance, Legislative, Law Enforcement, Foreman and Superintendents, Plant Visits, Playgrounds, Police, Publicity, Safe Drivers' School, Schools, Statistical, Traffic, Vigilantes, Women's.

The duties of these are, in most instances, evidenced by their title. What was actually done by each of them and the others not herein enumerated is given in detail in one of the accompanying exhibits. As evidence of what may be accomplished by these committees, a few specific instances are given.

Traffic Committee:

At the instance of the Council, the Mayor called a meeting in his office of representative citizens and business men, the result of which was the appointment by him of about 25 to act as an unofficial body to study the traffic needs of the city.

Legislative:

At this same meeting, it was agreed by those present, that three men, viz: the City Counselor, a representative of the Safety Council and a representative of the Auto Club should revise the traffic code of the city.

Law Enforcement:

A complete digest of the court situation, for the past four years, was made and given to the press.

Playgrounds:

When the School Board, the present summer, voted to close all school grounds and cease all recreational work for financial reasons, this committee organized public sentiment to such an extent that the Board rescinded its action and continued the work in a modified form. A great many such instances may be given but these will serve to illustrate what may be done.

DECLARATION OF PRINCIPALS:

As the council developed, it was soon evident that there must be some definite declaration of its purposes and its methods of pursuing them and that there must also be some statement made of the matters in which it would not participate. In a short form, this Declaration of principles, as it came to be known, was stated in the last published report as follows:

"The aim of the Safety Council is to reduce industrial, public and home accidents and fatalities through educational activities carried on in the factories, schools, churches, public utilities, on the streets, and in the homes; also for the promotion of health and the avoidance of danger and waste from fires. Its functions with City and State authorities, assisted by civic organizations and other agencies to further the principles of safety. Its endeavors to accrue co-operation between the

police, the courts and public, in an earnest effort to obtain better laws and proper enforcement of existing laws and regulations affecting traffic conditions on the streets—all vitally necessary to a safe community. It endorses no private commercial interest or candidate for political office."

TRAFFIC STUDY AIDS PUBLIC SAFETY WORK .

Of all the hazards that affect personal safety that of the automobile has become the dominating one, and it is certain that, as the number of machines continue to increase, so will the danger from them also increase. The hope of all engaged in safety work is that this danger shall not increase in the same proportion. To this end, much thought and study is being given to this particular problem in all of its phases. These include:

City Planning, with particular reference to providing highways of the proper location and physical condition.

Traffic regulation, by the enactment and enforcement of the proper laws for the control of the movement of vehicles.

Traffic direction, by means of traffic policemen, signs, signals, lights and mechanical means.

Education of drivers to the end that they may help through the control of the machine, knowledge of the traffic laws, and through their desire to prevent any injury to themselves and to others.

Each of these phases are distinct in themselves and each requires its special study.

City planning is, in most large cities, being done by commissions under municipal authority.

Traffic laws and regulations are usually the result of a composite of Municipal authorities, business interests and such organizations as a Local safety council.

Traffic direction by officers is, of course, a function of the police department.

Quite recently, much more attention is being given to direction by mechanical means, some of them operated by officers and some of which are either stationary or are controlled by internal mechanism. This last is of such a nature that it can be undertaken only by business interests, who expect, by their general use, to make a profit upon their manufacture and installation.

While a local safety council can, should, and does co-operate in these three items, its most definite work lies in the fourth, viz. the education of the driver and of the public generally, to do the thing first mentioned in this paper, that is, endeavor to prevent accidental personal injury in every possible way.

There accompanies this paper several exhibits, being the annual reports of the St. Louis Safety Council, including financial statements by a certified Public Accountant, samples of the annual budget, lists of supporting organizations and their quotas and lists of committees with their work. Those desiring more detailed information may find it in these papers.

THURSDAY AFTERNOON SESSION

Chairman Madden: This is the first time in the history of the National Safety Congress in which a separate section has been devoted to women and their part in the safety movement.

I don't believe any of us can call to mind a big movement which is fundamentally sound, which has been a 100 per cent success, unless women have been in cooperation with that movement, and it seems to me to be most sensible and most logical that the National Safety Council, through its officers, should reach the point where they think it is time to organize a Woman's Section of the National Safety Council.

A MOTHER'S INTEREST IN ACCIDENT PREVENTION

Mrs. J. P. THOMY, St. Louis, Mo.

The most vital cause for the existence of this great and good organization is the *mother*.

To woman is given the exalted privilege of ever re-creating, continuing and improving the race; and God Himself has so ordained that no man or organization can deprive her of this honor.

Many of us present may not believe in heredity in a general sense. But we recognize the effect of pre-natal influence.

Reflect with me for a moment with what care and love the mother and babe-to-be are protected by the family.

Could any interest in Accident Prevention be greater than the mother's?

Dr. Tigert of the Bureau of Education in Washington said at the Safety Congress last year: "Man's dependency is the longest of any of God's creatures!"

It is first and foremost upon woman—mother, teacher, wife. Some of you men in this gathering, in the seclusion of the home, if nowhere else, will ask of woman's sixth sense, intuition, what he ought to do under such and such conditions!

The bigger the man, the more freely he acknowledges this fact because he knows it is true love guiding him and for no material consideration.

The very first instructions are from the mother. Even the foster mother watches every movement of this little creature given into her care. Think how tenderly she heeds each cry to discern, if possible, the trouble or cause of the discomfort, and how zealously she guards against any further development from the condition present.

Love also teaches the mother; develops mother instinct, and out of this condition arises the first rules or laws toward safety—called "Home Hazards."

HOME HAZARDS VERSUS HOME SAFETY

It is at the early period—in the Home Period—that the parent must not give way to child-will but must firmly lead that will toward unselfishness and better citizenship. In this generation, child-will has become dominant through the selfishness of the parent. I mean the shirking of

responsibility toward teaching the child, and also the over-indulgent love of parent for child. Through this parent inertia we are now in a seemingly distressing condition of disobedience and lawlessness.

It is the duty of this Council to bring to the attention of the mother at home attending her family the things which men and women of sound reason out in the world have learned, because the mother must instruct the child. She must inspire constant alertness and instill the Safety spirit.

You Safety men have come to believe that all accidents are avoidable and many people agree with you. Professor Drake of Vassar College affirms: "Only babies, feeble-minded and insane are unaccountable." A person, trained from the cradle to be careful will not meet with an accident nor cause one. Nothing but the mother influence can perfect this training of the thought in the child.

All reforms, to remain universal, must begin with children.

Health is Opportunity! There is no limit to the heights one may climb if no accident cripples mind or limb, and we mothers have the dominant right to assist in saving all the loved ones of our communities through the knowledge of experience obtained in the work of the National Safety Council and its branch councils in our respective cities.

Every woman who has borne her babe wants it to share in the world with other whole-hearted and whole-bodied children.

Conceive the overwhelming disaster that is brought about by the destroying of a child—the irreparable loss to the mother, the possible loss of a great mind to the world, and the economical loss to the State—e. i., the support of some family for, I believe, the great majority of accidents are to males.

SAFETY IN SCHOOLS

Safety is becoming a study in the schools throughout the country by the educational system advocated in the books of the pioneer in this work, Dr. E. George Payne, who although residing at present in New York, belongs to us of St. Louis. Teachers are doing their duty in the schoolrooms of the cities where the boards of education have seen this great light of the ages.

Until Safety becomes characteristic or habit, it will never become an established fact. We add more safety appliances and we legislate to no avail if we have not established character. In this day of lavish spending there are still a few things one cannot buy, and character is one of these.

The foundation stones of this most necessary possession are, obedience, respect, consideration, discretion, and these can be laid best around the hearthside under the supervision of mother.

In the not far off days I sincerely hope to see the glorious Golden Rule, the ancient royal law, re-established. "Love your neighbor as yourself." Real Safety is something you cannot hear, taste, see, smell or touch, but a spirit of protection brought into existence from a mother's interest in accident prevention.

Chairman Madden: It would seem to me that this might be the opportune time to invite suggestions as to the organization of a Woman's Section of the National Safety Council. Has anybody any suggestions on that?

Mr. Remmers: I make a motion that a nominating committee be appointed.

(Motion seconded and carried.)

Chairman Madden: I will appoint as chairman, Carl L. Smith of the National Safety Council, Charles M. Anderson of the Memphis Council, Paul F. Stricker of Baltimore, Julian Harvey of Kansas City and J. H. Goldie of the Detroit Safety Council. We would like to have you adjourn now and report as promptly as possible, so the result of your efforts can be made known to this meeting.

A MOTHER'S RESPONSIBILITY IN SAFETY EDUCATION

DR. E. GEORGE PAYNE, PROFESSOR OF EDUCATION, NEW YORK UNIVERSITY,
NEW YORK CITY

The achievement of the aims of accident prevention have gone far more slowly than would have gone if women had become more vitally interested (because they have been supremely interested) but if they had become vitally active in the history of the movement.

I am thinking of two persons here in this room from St. Louis that I know and with whom I have worked there, Mrs. Thomy and Mrs. Stuart, who have been actively identified with the work there, who ought to be giving as much time as possible speaking to women's clubs and organizations and bringing this message of safety as they can do it and as you see it has been done in Mrs. Thomy's address this afternoon, yet there are few who have been up to the present time, doing this sort of thing, either in a national or in a local way.

Miss Beard has taken the eminent position of leadership among the women in the work of safety education, and has done a splendid piece of work in Detroit. I was called to the Indiana State Teachers' Association last fall and one of the addresses I gave there was to the convention of mothers' clubs. They were meeting with the State Teachers' Association and some 500 women representing the various clubs of various parts of the state were there. I put over to them in half an hour's talk the best I could, the problem of education in accident prevention, and the duty of women's clubs and the mothers in carrying out this great work, and those people became interested. They called upon us for material; they raised money to put it into the hands of every club member in the state and they undertook in that state as one of the features of the women's club program last year the promotion of education in accident prevention, and there are hundreds of women's clubs in the country that would be ready to undertake a similar kind of work if the message was brought to them. There are too few of us who have been giving our time to bringing the people of the country to the realization of the situation.

This is the sixth convention I have been actively participating in, and I have had intimate connection with the safety work of the National Safety Council. I remember when we attempted to have a meeting in Chicago just about four years ago. The National Educational Meeting there had about eight or ten thousand superintendents and principals and college teachers from all parts of the country that had come there to hear the latest things that were taking place in education.

ORGANIZATION OF EDUCATION SECTION

We got out placards and placarded the hotels telling that there was a great meeting of educational and accident prevention workers in one of the hotels there, and I can count on my fingers the persons who were there. No educator would come.

That was the beginning, and when I spoke to those people about the work of education in accident prevention and its possibilities, they would simply smile and say the problem of the elimination of accidents is not a matter of education, it is not a matter of the schools, it is a problem of the policeman, it is a problem of the courts, it is a problem of industry, it is a problem of everybody else except the school-teacher.

It is one of the most interesting achievements with which I have been connected or have known, the development of interest in education in accident prevention since that time, and the way the public school people themselves have come to look upon it.

Let me enumerate just some of the things that will make this concrete and indicate to you what has been achieved in these few years along this line.

A year ago one of our leading universities established a position for the purpose, as part of that work in instruction in accident prevention and methods of teaching prevention in public schools.

This year I have in my classes some five hundred teachers representing all the principals and superintendents and those who are entering into the work of education, representing many of the state unions who are taking courses, that are giving their whole time to the consideration of education in accident prevention as a school problem or a part of the time will be devoted to a consideration of that problem.

I arranged, just before I left New York, to go to Paterson, New Jersey, a town of a hundred and twenty thousand. The Board of Education at the urgent request of the mayor, provided out of the expense of the Board of Education's funds, to have me hold 15 two-hour conferences with the whole Board of Education, and the whole teaching body in which we can work out for that city a program of education and accident prevention and education in health.

SECURING THE COOPERATION OF TEACHERS

New York is doing somewhat similar things, and it is only because my time would not possibly permit that I did not go to Bridgeport where the Board of Education proposed to do exactly the same thing they are doing in Paterson. There is the change that is coming about, not only among boards of education but among educators who are ready to take hold

of this work and carry it out in the schools. I have told before at this convention of addressing the Schoolmasters' Club in New York City, a club made up of principals and superintendents in New York's industrial area representing one in every ten children in the United States, and at the close of that meeting those 700 people who were responsible for the education of one in every ten children of the United States arose and pledged themselves to undertake education in accident prevention as a part of the curriculum and their regular instruction. Now, that is something of the achievements. We have had numerous materials that have been prepared in Oregon, in Wisconsin, in Pennsylvania, Detroit, Chicago, Kansas City and Cincinnati and dozens of other cities for the purpose of instruction in accident prevention and they have prepared their own syllabus, for the purpose of instruction in accident prevention and they are prepared by teachers within their own cities.

New York state is just now calling a committee for the purpose of preparing one for the state of New York, and there is a great deal of material that is being prepared.

This indicates something to you of the momentum to be gained in this movement that began only in an organized way some five years ago and has been going on and going on with increasing force until the thing has reached the point where there is, it seems to me, no need for propaganda. There is need for assistance in helping to carry out this program in an effective way, and that is where the women of this day have their opportunity.

Now, as Mrs. Thomy pointed out, there is no one who is so definitely responsible for the children as the women themselves. They are responsible for, in the education of the child, the mother is largely responsible. She is in the home, she is there when the children are there and the father is not, because of duties that he has to perform and from which he cannot escape, and so the large problem of education, so far as the home is concerned, belongs to the mother. The mother has felt this keenly. The mother has felt strongly the necessity of preventing accidents but why has it not been done? It is very obvious. The development of accidents is a matter of very recent history.

TRAFFIC MENACE IS NEARLY 25 YEARS OLD

In the celebration of the twenty-fifth anniversary of the establishment of greater New York in 1923, they showed moving pictures of New York in 1898, and while that is not very far back and most of us here can remember it, those pictures on 42nd and Broadway showed the fastest moving vehicle was a street car pulled by horses. They had no trolley. They had no automobile. The highest houses in that vicinity were five and six stories high and there were pictures of these people moving across the street. They were walking across the street, some of them with hats in hand, unconscious of anything taking place in the street, and did not need to be, because of the fact that horses would not run over them if they had gotten in their way, and since it has become so congested with thousands of automobiles and moving street cars, etc., it

means death whenever one is not alive to the dangers of the situation. That is just 25 years: we have not learned yet. We, who have made a statistical study of the situation, have learned there are certain things we cannot do. There are certain things we must do and there are certain types of behavior on the street that are necessary for self protection, but that knowledge has not even come to the mothers of the country. When the mother sends her child out to the street or to play, she says, "Be careful, keep out of the way of automobiles and street cars," and statements of that kind are absolutely ineffective in the child when he comes into the presence of a dangerous situation, because he is under the domination of impulses, impulses that are necessary for the very development, he is under the domination of habits of behavior and has not the intelligence, the specific intelligence necessary for self protection.

Mothers can organize and bring to their attention that in the United States that there are certain specific causes of accidents to children under six years of age, and there are a few other causes that are causing accidents to children from six to sixteen years of age, and if you want to prevent accident to children of those ages you must not rely on general warnings but must develop in the child the habit of action when he is on the street or out from under the care of the mother so he will automatically take care of himself with reference to the situation.

We have learned from the statistics in Connecticut that 92 per cent of all the accidents occur at other places than the designated street crossings. The statistics month after month in New York City this year show that 85 per cent of all accidents that occur in that city occur at other places than the designated crossing, in spite of the fact that a check-up shows that only three or four per cent of the people at the most at any time cross in other places than the crossings. If you could eliminate that three or four per cent you could eliminate 85 per cent of the street accidents to children, and yet does the mother take the child down to the crossing and say, "This is the way to cross," and practice with that child or train that child to the point of always crossing at the crossing? No. When they are in a hurry they don't even go to the crossings themselves, and the same thing is true of looking in the right direction, which has been featured here this week, and I might run through some dozens of causes of accidents to children, each one just as simple as that. These could be brought home if we had somebody to be the messenger, to go about the country and tell the mothers who have the children and the responsibility for them what they can do in the elimination of accidents and the other things.

WOMEN MUST BACK UP EDUCATORS

The other thing women can do is to back up the educators who are now deeply interested in this problem by the discussion of the matter in the mothers' clubs, the Parent-Teacher's Association and every place that they can be heard with reference to accident prevention, and to let the teachers know that they are back of them in their endeavor to teach those things that are essential for life and that are essential in life.

Do you know the situation in the United States? There are 800,000 school teachers with 20,000,000 children in the public schools today. There are 1,000,000 teachers in public, private and parochial schools and 25,000,000 children in the public, private and parochial schools today in the United States, and we have a problem that means that every home, every family, virtually, is represented either directly or indirectly by some child in the schools that is being educated at the present time.

How long would it take if we could get the concerted action and effort of those million teachers? How long would it take to develop in those children control over these few simple situations that are necessary to prevent accidents? In a month's time, if we could get these one million teachers concentrated upon it, we could do the trick, so far as almost every accident is concerned, but it means enormous intelligence to be distributed. The average teacher is unaware of the causes of accidents; she is aware in a general way, but does not know the specific causes and the specific means of prevention, and that is not saying anything in disparagement of the American teaching profession.

A few years ago, no teacher regarded this problem, as I said before, as her problem, or very few did. The situation is so new that it is a serious matter, and furthermore, we are not going to be through with this problem when we have taken care of it so far as the condition now exists.

I congratulate the women who are gathered here today in the beginning of this movement. We ought not merely to have a section of the National Safety Council, we ought to have so many women coming together every year that it would over-shadow the council, because of their numbers and enthusiasm for this great movement in the protection of human life, and I know that the women are able and interested and under the leaders you will select this afternoon can do great things for the work.

REPORT OF NOMINATING COMMITTEE

The committee nominates Mrs. J. P. Thomy, of St. Louis, as chairman of the Women's Division for the coming year; for first vice-chairman, Miss Harriet Beard, of Detroit; for second vice-chairman, Mrs. Joseph R. Wilson of Philadelphia, and for third vice-chairman, we thought it only right to ask the Buffalo people to name some one woman from the many clubs and organizations here to represent them on this committee, because the Buffaloes have had the inspiration of this Congress.

For fourth vice-chairman is Mrs. B. W. Nutt of Cleveland, and for our secretary, Mrs. Louis H. McBrayne, of Boston.

(Motion made, seconded, carried and report accepted.)

(Mrs. Thomy took the Chair.)

TEACHING THE CHILD TO BE CAREFUL

MISS HARRIET BEARD, SUPERVISOR OF SAFETY, EDUCATION, DETROIT PUBLIC SCHOOLS, DETROIT, MICH.

The massacre of 20,000 children in the United States might lead any pagan nation to inquire as to what our civilization consists of. The

menace of accidental death under present conditions is steadily increasing. Not a home anywhere in the United States is immune, and not a parent is exempt from fear and dread. Worry and lamentations and talking about it are of no avail; they will not result in meeting a situation like this, and yet that is what most people are doing. Prompt and vigorous action is necessary. Everybody in the community must be enlisted for safety. Time, labor and money must be spent without stint if the saving of lives is any consideration. Now, all who have given any serious study to this problem and all who are working to bring about a reduction in the accident death rate arrive at the same conclusion, that safety education offers the only solution to the problem. It is the only effective and practicable means of meeting the situation and reducing the death rate.

Wherever safety education has been tried in St. Louis and Detroit and all the other cities where the schools are working on this thing it does bring about results promptly, it does result, without a doubt, in reducing the number of accidental deaths of children. It takes only a few moments to show that safety education pays from every point of view. In safety education lies the final solution of the accident, and in that lies the hope of the future in school safety in the situation in industry and safety viewed from any aspect. Education is the only means of meeting this terrible problem.

People think sometimes that the safety education of the child begins in the school. Unfortunately, it does; it should begin in the home in the earliest years and should be carried along steadily in a manner that will be adapted to the understanding of the child and to his activities. It should tend to develop instinctive care and caution and a feeling of responsibility for the protection of others rather than to instill fear. It can be carried on in a constructive way, avoiding all the morbid details of accidents.

The chief aim of safety education is the formation of safety habits in the child. By the time the child enters school he should have a knowledge of the fundamental principles of avoiding home accidents such as falls, scalds, burns, shooting, cutting, poison, etc., and should have acquired habits in the use of his toys and contact with other children outside of the four walls of the home. He should by the time he goes to school know how to cross the street, how to cross the corners and he should know how to play in safety and be provided with safe places in which to play. I think we can't stress this too strongly, and especially in the cities where the crowds are so great and places to play are so few. We cannot expect to limit accidents unless we provide playgrounds for the children.

TRAINING IN THE HOME IS VALUABLE

If the child has had this training in the home and is taught care in playing with other children and is told to keep out of the street and cross in the proper way and look before he steps off the curb, when he goes to school he will have a good foundation and the teacher will have something to work on and will not have to begin at the beginning of things.

Fathers and mothers can encourage the school boards to include safety education in the curriculum, and they should not only encourage but should insist on having it. They are paying the taxes, and the education of the child should fit him for the needs in which he finds himself.

The parents also can take an interest in what the children are doing and ask them when they come home what they are learning so the training will be dignified and not laughed at. The children are all eager to go home with these messages, and if the parents can take time to hear what they have to say, and say "That is fine; let's do that at home," I think safety education in the school would be greatly helped.

We have had children go home with fire inspection blanks they made at school. In some of our most favored neighborhoods where the homes are comfortable, the children have gone home and said, "Mother, I am going to be a fire marshall and help the firemen prevent fires. I am going to inspect the house and see how many fire hazards we have." In those neighborhoods many children will not bring back the reports for they are so ashamed. I say let's make the inspection blanks amount to something in the child's mind. If a child comes home and says, "I am going to make an inspection," say, "Isn't that fine that you are going to help us discover whether our home is safe."

What a different attitude it would make on the part of the child. He would not come back ashamed and refuse to show his report. The parents can do so much towards helping with these things.

Through the united efforts of the Parent-Teachers' organization and all women's clubs and different organizations you can do a tremendous amount to boost safety. If you club together and provide playgrounds or fit up adjacent lots in some neighborhood where the children have playgrounds, spend just 25 dollars and get a few things, some apparatus, and have a place where the children can play we will have an outlet for the energy and if we do not provide a place for them to play and let out their energy we can't expect to have a decrease in the number of accidents. We must have those things if we are going to save children from being killed on the streets of the city.

COMMUNITY EVENINGS

Another thing that seems to be helpful is community evenings. We ought to open those more for the parents of the neighborhood. They come together and have singing and perhaps the children put on some little stunt, and if you can have the children take some part and have a little safety exhibit the parents will turn out and go home with some ideas.

Now, when the children start for school it is well to talk over with the principal the route the child should take. Always insist that the child go by the same route, and the children of the neighborhood coming along together helps them, for a driver will slow down where he sees a dozen children together where he sees boys helping them, where he won't if he sees one, for he does not know what the child is going to do. If there are a dozen they act with more sense and if they have a traffic patrolman they will go across when the boy tells them to go.

The main thing is to start them in time. The boy running around the last minute looking for his cap or something else is the one that usually meets with the accident as he hurries to get to school on time. If the children have a definite place for their things they will get started on time.

The most important thing of all is for the parents to know the traffic rules and obey them. When parents are driving they must drive carefully. We have hundreds of children injured and some killed in the custody of their own parents, driving in the family car. All our work is aimed to educate the children, but in everything we plan we think of what effect it will have on the parents. We consider whether it is going to teach the parents to be more careful, and it is discouraging when we train the children and go out on the street ourselves and see a parent dragging two or three children over the street crossing without paying any attention to the traffic signals. If the parent will only set an example and do the thing that the traffic rules dictate, that will help to train the child to be careful.

ACCIDENT PREVENTION IN THE HOME

H. WALTER FORSTER, INDEPENDENCE BUREAU, PHILADELPHIA, PA.

Those of you who are students of biblical history know that our troubles really began with a fall in the Garden of Eden. Since that day falls have been our most serious accident hazard. More people are injured by falling than in any other way. How do people fall? In the first place we have stairs. When you consider steepness, lack of light, lack of handrails, the placing of runners on stairs and the habits that children have in leaving obstacles on stairs, it is no wonder that persons fall and are injured on stairways.

A simple thing, a most phenomenally important invention was the staircase, and the no doubt most hazardous part of your house. You can provide handrails and illumination and you can preach to the children the gospel of not leaving things on the stairs.

Supposing you were to say to me that the chance of my falling at the foot of a stair was one in a thousand. I will accept your figures. How many times does one go up and down in the course of a day? Half a dozen times? That makes four thousand trips a year; 4,000 chances per year.

Make it a ten thousand to one chance; that is once in five years. You have got to get the point of view that if there is a hazard the intelligent person gets rid of the hazard before he or she has been laid low by it. That is one of the fundamental questions in safety and it applies particularly in the home, for the average woman does not get the outside statistical, broad experience point of view.

The ladder is a dangerous device. A very large number of falls from ladders in homes have taken place. Get a good solid step-ladder. They are expensive if they are good, but they are worth while.

A woman of my acquaintance fell and sprained her ankle because she stood in a rocking chair to adjust a picture. I must at least mention the bath-tub hazard. Only this morning I came within an ace of breaking my neck because I slipped in a bath-tub. It is really a serious matter, and if I build a new house I am going to have "grab handles" set in the tile.

THE DANGER OF FIRE

The subject of good housekeeping in an industrial plant is vitally important from a fire and accident prevention standpoint. The same thing is true in a dwelling. The degree of housekeeping maintained in the average residence is fine, except in the basement. A match carelessly discarded or an electric short circuit or coal falling out of a hard coal heater, such things are far more dangerous in a poorly maintained basement.

The records show that 10,000, possibly as many as 15,000, persons are burned to death in this country every year, 60 per cent children, 19 per cent men, and 21 per cent women.

It is astonishing how much mechanical equipment we have in the modern house. We have fans and vacuum cleaners, percolators and grills, clothes and dish-washing machines; even electric ice-cream freezers. Such mechanical equipment has considerable hazard connected with it in gears and beltings and chains—and while the manufacturers of such equipment are doing a great deal in the way of safeguarding, you can lose a finger just as well on a clothes washer as in a machine shop. Closely coupled with the use of the mechanical devices are the electrical hazards.

Probably most of you did not realize how dangerous to life a 110 volts are. People are frequently killed in homes and industry by a 110 volt shock. Far more people are killed by low voltage than high, not because it is more hazardous, but more people are exposed to it. Every time you take hold of an incandescent lamp socket you have a possibility of trouble and the danger is particularly acute in a basement, especially in using electrical devices, such as irons. If one side of the circuit is grounded and you stand on a concrete floor, you have a chance of being killed.

The best arrangement for bathroom lighting is to have the switch at the door, away from plumbing and radiators. Some of us have weak hearts and we die easily from shock. I know of a case in San Francisco where a person was killed by 65 volts. You should make sure your wiring is in good condition. Don't let the small boys in the home be the electricians, and be careful in basements where there is a chance for grounding.

In our household we have very few matches; they are kept up high and we have the children trained, I hope, so they will not want them. We warn them over and over again, just as we preach daily "When you get off the car look both ways."

CLEANING CLOTHES

The average woman realizes there is some danger in cleaning with gasoline and she will say that she never cleans with it near an open fire. That shows a trace of intelligence on her part, especially if she says she never cleans with it in the house. But what that woman does not realize is that she can use it out in the apple orchard, in the shade of the old apple tree, away from every flame, and yet, because of static electricity, ignite the gasoline and her clothes and burn to death just as effectively as in any other way. I have known of women trying to heat gasoline on a gas stove to make it clean more effectively.

If it is at all possible for you to do so, if you are financially able to do it, your cleaning should all be done at a professional cleaning establishment. When you can't afford that use a patent chemical that will not explode.

The answer as regards safety in a large number of homes or in a given home is dependent on the fact that you understand a few of these fundamental, simple principles, that you bear them in mind, preach the gospel, set an example and hold to it.

STREET SAFETY EDUCATION FOR SCHOOL CHILDREN

J. WESLEY BROWN, PATROLMAN, DEPARTMENT OF POLICE, DETROIT, MICH.

Of the children who were killed last year in Detroit our coroner's juries returned the verdict that 66 per cent of them came to their death through their own carelessness. We could hardly concede that, and when we found that the children were not the ones to blame began to ask ourselves who was to blame for the slaughter of the little one, and instantly we began to see that the Police Department had a responsibility, and we began to assume our share of that responsibility, so we asked and received from the Board of Education permission to go into the schools and teach the children the danger of the streets, and we laid down to them the correct use of the streets and the principles of right walking.

It might be of interest to you to know just these principles and our methods of teaching them to the children. Of course, the first thing a policeman has to do in going into a school is to win the good will of the children, because at home a policeman is held up as the bogey man and we have to dispel that sort of an attitude. I might say for those parents who hold up the policeman as that monster man who gets little children and carries them away in the dark that if you are in the habit of doing that your children as soon as they go to school are going to place you in the Ananias Club for just as soon as they go to school and get out from the home we policemen are going to teach them that we are not bogey men.

Then, because children live so much in the world of make-believe, we ask them to make believe with us, and we make believe we go for a walk with them. It has been found to be an efficient way to get them to visualize the street, to draw a diagram on the blackboard and along the sidewalk we make believe we are walking together until we come.

to the curbstone, and there, because it pleases them so much we personify the curbstone and have the curb talk to us. The curb says "Stop" and then it tells us to look first to the left and then to the right, and we explain to them why, or let them guess why it says to look to the left first and then to the right, and then it tells us to wait until there is nothing closely approaching.

Now that is not a very great task. It should not be, even for grown-ups. Before we told them that we went out through the city to investigate and we found that never, outside of our very busiest streets would any one have to wait more than 30 seconds for a safe opportunity to cross. So we tell them to wait until nothing is coming from either left or right, and then walk, not run, across the street, because running is dangerous and we explain to them how, if one is walking across the street, a driver will have time to turn behind or in front, but, if running, sometimes the driver can do nothing but run into them. The great principle then is stop at the curb, look both ways, wait until nothing is coming and walk across the street.

EDUCATION BY STORY TELLING

The next principle we develop by pretending we are down in the middle of the block and want to cross the street. Then we personify the automobile parked at the curb, and the auto tells us to go to the corner and cross on the crosswalk, and we explain to them what a crosswalk is, and the great danger in crossing away from the crosswalk, and how 80 per cent of our accidents to children occur away from the crosswalk.

The playing, roller skating, soliciting rides in the street we develop by stories. If you give some-one something to do that will keep in their mind these things, they will remember them longer, so we tell them about how many policemen and policewomen are all working to make the streets safe, but in spite of the great number of them these accidents do occur. We ask them whether they would like to be a police girl or police boy, because they might do what we didn't do, and invariably every little hand goes up just as high as they can get them, and some raise both hands, and to drill them again we go over it and tell them what a police girl or boy must know, what the curbstone says and the automobile says and the dangers of playing in the roadway and give them the task of going out and looking around just like a policeman, and when they see some little girl or boy who forgets, they must speak for the curbstone and speak for the automobile and tell them about the dangers in the street.

The Board of Education of Detroit realized that it was not the driver's fault always, that it could not be the children's fault, so they assumed a share of the responsibility along with the Police Department, and we organized a Bureau of Public Safety, or a Bureau of Safety Education, and placed Miss Beard in charge. The work of the teachers and the work developed was to impress and keep ever in the minds of the children these principles that we of the Police Department laid down. Now, their methods have excited our admiration.

One method was to appoint a great number of the boys and girls as police boys and girls and give them a badge. They love a badge. They were to go out around the playgrounds and act as a regular police officer and whenever they saw a girl or boy violating a principle of safety they were to warn them about it and if they persisted they were to bring them in before a court and they have organized, in many schools, a little traffic court and have adopted the principles we laid down of safe walking. The children are often taken down to the court to see how court is conducted, and I have attended a number of these children's courts and it is a surprise to see the ability that is developed there.

I have heard a little boy deliver an oration that would put our prosecuting attorney to shame, and the audience in those courts, made up of children, show their disapproval. I have no one more embarrassed over his misdeeds than a little culprit brought up for crossing the street in the middle of the block. The lesson will stay with them for life.

You might say, is it possible that these principles can be taught to children, little fellows with immature minds? Is safety education possible? Does it produce results?

DETROIT SAVES 143 LIVES IN YEAR

Well, figures don't lie. We will let them tell. In 1919 we had 96 public school children killed. That was the year we started safety education, and last year, 1922, in spite of a 30 per cent increase in the number of children, and a 43 per cent increase in the amount of traffic, where accordingly we might have expected to kill some 178 children, we only killed 36, a saving in 1922 over 1919 of a 142 little tots.

We teachers and policemen teach these children the principles of safety and parents all too often unteach them what we have taught them. To illustrate: one morning last winter I got up early and went out and started to shovel the snow off my sidewalk. I saw, coming down the street with long strides, a big broad shouldered man. In back of him came a little chap about knee-high trying to step in those steps his father was making in the snow, and I thought how like a boy to step in the footsteps of his father. When they lead a jay walking course naturally that little fellow will follow, and all the policemen and teachers in the world can say what they want but it is nothing compared to the teaching of the hero and the greatest of all men to that boy, his daddy. I think we might have saved a large part of these 36 children killed last year had we had the cooperation of the fathers and mothers.

I have actually seen mothers come down town and drag their children across against the traffic sign. I have spoken in the most diplomatic manner possible to the mothers and told them they were teaching that child dangerous habits, and have had them turn on me with "Mind your own business, you big brute."

Now, I guess about all of you are killing children in your own towns and if you want to do something, perhaps a practical suggestion of how to do it would be the most beneficial.

The first thing is if your Police Department is not laying down the principles of safety get after them. I might say, too, it is difficult for the teachers to teach these subjects about which they don't know a great deal. Most of them come from small towns and don't know much about these hazards, so if you get your Police Department to lay down the principles of safety you have made a start.

If your chief happens to be a hard-headed policeman who thinks his work consists only of running down hardened criminals, get the ladies after him. A chief may withstand all the onslaught of the newspapers and the politicians and everything else, but let me give you a tip: when the ladies get after the chief of police he generally moves. You can do the same thing with your Board of Education, and if your women's clubs will get back of your Board of Education they will put in safety education

ADJOURNMENT.

Public Utilities Section

October 2 and 4, 1923

A. O. MITCHELL, Chairman

Adjuster, Northern Indiana Gas & Electric Company, Hammond, Ind.

H. A. MOTT, Vice-Chairman

Illinois Bell Telephone Company, Chicago, Ill.

H. J. BURTON, Vice-Chairman

Consumers Power Company, Jackson, Mich.

E. R. DOBBIN, Vice-Chairman

Empire Gas & Electric Company, Geneva, N. Y.

B. B. McCULLOUGH, Secretary

Bureau of Safety, Chicago, Ill.

TUESDAY MORNING SESSION

CHAIRMAN MITCHELL: There are one or two outstanding things that the section has done during the past year that I think perhaps will be worthy of mention. One of them particularly is the paper that we have had prepared under the able chairmanship of Mr. C. J. Rutland, of the Dallas Power and Light Co., entitled "Accident Causes and Remedies." Mr. Rutland and his committee have done what I consider quite a wonderful work in preparing a paper and preparing data on this subject.

REPORT OF SECRETARY

B. B. McCULLOUGH

In many respects, the past year has been the most successful in the history of the Public Utilities Section. It is now the largest section in the National Safety Council in point of number of members. There are sections, notably the Metal Section and the Steam Railroad Section, which have on their membership list companies employing as many as 200,000 men, so that other sections include more employees; but the Public Utilities Section today has 256 members. Twenty-four of these have been taken in during the past year, while seven cancellations have been received, making a net gain of 17 members. This in itself, I believe is a good showing, but it is more favorable than the figures indicate, for the

reason that the 24 members that have been received include 18,700 employees, while the seven companies who have cancelled their membership include only 1,300 employees, so that there has been a net gain of 17,400 for the year.

I believe the service of the section has been improved during the past year, particularly with reference to the Safety Bulletins, three of which have been issued each month, and the articles in the National Safety News.

In this connection, I suppose no section meeting would be complete without an appeal for help in the preparation of the Safety Bulletins. The continued success of the section is not alone dependent on the service it renders the members but equally as well the assistance received from the members, and with the proper cooperative effort of the membership and the sectional officers, I am sure the coming year will show continued growth and improvement in the service.

(On motion duly made and seconded, it was voted to adopt the report of the secretary.)

REPORT OF BULLETIN COMMITTEE

GEORGE OPP

The proposition of a bulletin committee is one of real work; there is no question about it. The effort to get the kind of bulletins that we feel we need entails considerable effort not only on the part of the committee but on the part of all members of the section.

Your committee on bulletin reports that during the past year, it has addressed more than 1,000 letters requesting ideas, suggestions, photographs, drawings, or any material from the various members of the Public Utilities Section. The chairman has received 101 individual responses of which 38 promised assistance; 63 others enclosed or later sent material for prospective use in the preparation of bulletins.

All of those suggestions which were considered at all of general interest and applicable to the hazards of our section have been forwarded to the headquarters of the National Safety Council. Many other suggestions have been directed to the particular section of the National Safety Council which has direct interest in the topic or suggestion presented.

To the entire headquarters staff in general and to Mr. R. T. Solensten, Supervisor of Bulletins, Mr. Sidney J. Williams, Chief Engineer, and Mr. F. M. Rosseland, Chief of the Public Safety Division, in particular, the committee is deeply indebted for the kindly cooperation that has made possible the printing of a monthly supply of at least three different bulletins (in each issue of the National Safety News) devoted to the extension of interest in Safety and Accident-Prevention in the Public Utilities Section.

(On motion duly made and seconded, it was voted that the reports of the chairmen of the committees be accepted.)

APPOINTMENT OF NOMINATING COMMITTEE

Chairman Mitchell: Next is the appointment of the nominating committee. I will appoint on that committee Mr. William Darlington, of New York; Mr. H. B. Harmer, of Philadelphia; and Mr. Ernest S. Beaumont, of Chicago. They are to report at the Thursday morning meeting.

REPORT OF ACCIDENT CAUSES AND REMEDIES COMMITTEE

C. J. RUTLAND, SAFETY ENGINEER, TEXAS POWER & LIGHT COMPANY, DALLAS

The most valuable knowledge we possess is that which comes through making a mistake—through experience. Accidents are mistakes as well as experience. To realize on an accident is collecting revenue from the refuse. Some companies have accidents, deplore them, but keep right on having more. With the thought of getting a closer insight into the root causes of past accidents in the public utilities industry, making a careful and diligent study of these accidents and offering some suggestive remedies for the possible elimination of future ones, a committee called "Accident Causes and Remedies" was appointed at the Executive Committee meeting of the Public Utilities Section following the Detroit convention. Questionnaires were prepared and mailed out to all member companies calling for complete reports of their 1922 accident experience. This report, therefore, represents the findings of this committee and is based on a study of the many causes of these accidents.

Only the accidents to the constructing and operating employees are included, as no consideration was given to those occurring to the office or sales employees.

Number of companies reporting.....	119
Average number of employees during 1923.....	119,469
Total number of accidents reported.....	25,314
Number of actual days lost from work on account of accidents. (Does not include fatalities).....	176,941
Deaths reported	126

Respectfully submitted,

Accident Causes and Remedies Committee.
of the
Public Utilities Section,

C. J. Rutland, Chairman
W. H. Mulligan
W. R. Loyd

REVIEW OF ACCIDENT PREVENTION SITUATION

Taking these reports as a whole, as a digest of the accident prevention situation in the public utilities industry, your committee believes that great strides have been taken in the movement. The importance of making accident prevention a part of the operation of the business is being felt. Its prestige is greater now than it has ever been. On the other

hand accident prevention in a number of member companies is not yet given the proper respect and attention as compared with other departments of the organization.

It must be remembered that the working conditions in a public utility are far different from those in any other industry. The employees are widely scattered, and their work is very diversified. They are not concentrated as in a mill or factory where training is comparatively easy. Neither do the accidents which occur follow the general characteristics of those which happen in other industrial concerns. An employee in a factory may be working day in and day out at a punch press. A lineman in an electric utility may be connecting lightning arresters this hour, stringing wire the next, climbing poles the next, and so on. The factory employee may get hurt at his job. Possibly the remedy would be a punch press guard. The utility employee may get hurt at his job. Possibly the remedy in this case would be a system of training the employee in his work, the need for an all-seeing foreman to anticipate accidents and to supervise his many hazardous duties, or many other possible cures.

In Public Utilities, the human element, rather than the mechanical safeguard, is the governing factor in accident prevention, and it is the one factor which has not been sufficiently emphasized. Any employee of a public utility can get hurt, possibly killed in the performance of his job; therefore, accident prevention, to be effective, must be made a vital part of the daily operation of the business. It cannot be treated as a side-line. A gathering of employees at a safety meeting is well; it brings about discussions of physical hazards and operating methods and its prime purpose is to solicit the cooperation of the employee. But it is out on the job where the actual work is being done that these reported accidents have happened.

CLASSIFICATION OF ACCIDENTS

In studying the causes of these accidents, it required only a first glance to classify them according to the original classification, such as Handling Tools, Electricity, Slipping, Tripping and Falling, etc. This classification is possibly the only kind that is suitable for insurance and statistical purposes, but from the standpoint of suggesting means of preventing future accidents, it is of no value. This kind of classification does not point out why an accident happened or who is to blame. It does not say whether the foreman had failed to caution or instruct the injured regarding his work, or whether the injured had violated rules. It does not determine the human equation that possibly may be the cause of the accident and which is so often termed "carelessness." Consequently it was necessary to go far beyond these surface causes and look considerably deeper for the fundamental reasons why these accidents occurred. Many contributing factors began to appear and there was revealed the fact that the root causes, in the majority of cases, were due to the lack of responsibility on the part of either the injured workman or his supervisor.

Having come to this conclusion, it only became a matter of applying a list of fundamental underlying causes to determine the principal contributing factor of each accident. The following classification of basic causes

recommended by the Accident Prevention Committee of the National Electric Light Association and recently adopted by a great number of the larger utility companies, not only provided such a list but the very nature of the classification causes suggested remedies for the prevention of similar accidents.

ANALYSIS OF ACCIDENTS AS TO FUNDAMENTAL REASONS

- (1) Class of work beyond physical or mental ability of injured.
- (2) Improper tools or devices.
- (3) Lack of proper instruction.
- (4) Method pursued not suitable for work.
- (5) Protective devices not used.
- (6) Rules for instruction not observed.
- (7) Protective devices not provided.
- (8) Lack of proper inspection and maintenance.
(Defective tools, materials and devices.)
- (9) Contributing negligence of others.
- (10) Intemperance.
- (11) Mechanical manner of doing work,
(lack of concentration).
- (12) Haste.
- (13) Physical condition of injured.
- (14) Poor judgment.
- (15) Willfulness.
- (16) Conditions beyond control—(a) elements; (b) non-industrial.

A report of an accident from one company says an employee received a broken leg and ankle when, in assisting to unload a car of poles, one of the poles rolled off the car and knocked him down, resulting in three months disability. The foreman was on the job, supposedly supervising the work. He was at one end of the car and watched this man walk up to the side of the car to remove the last stake and let the poles roll off. The injured figured he could get away before they fell. This accident is typical of many others. Its cause lies in the fact that the foreman did not shoulder his responsibilities. Certainly the method pursued was not suitable for the work and the issuing of specific instructions for the performing of certain jobs is most assuredly the duty of a foreman.

A gang of men was overhauling some gas distribution mains, looking for leaks in the system. An old valve was being replaced with a new one. Gas bags were injected into the mains. One of these was defective, which fact was immediately made known to the foreman, but he let them take a chance with it. The bag gradually went down, allowing the gas to escape into the hole. Some school-boys stopped to see the work going on and this loitering should not have been permitted by the foreman. A lighted match caused the explosion, resulting in bad burns to two workmen and one of the school-boys. One of the workmen died later from the effects. Certainly the defective bag should have been replaced with a new one. Thus it appears that the fundamental cause of this accident was contributory negligence, or violation of rules on the part of the foreman.

In a certain company, a lineman was electrocuted and the safety engineer was dispatched to make a detailed investigation. The local manager and foreman expressed their regret that the accident had occurred, and added that the accident was purely the fault of the injured, not giving thought to any responsibility that might rest on them. It developed in the investigation that the employee was killed when he was installing some lightning arresters on a pole in the distribution system. His knee came in contact with an unprotected ground wire and his arm with a hot primary. He fell back in his safety belt lifeless from the effects of the shock. He was lowered to the ground and died simply because of the ignorance and incompetence on the part of his comrades in not knowing the proper method to resuscitation.

In the first place, the victim was not installing the arresters in accord with specifications of the company engineer. His not doing so was no deliberate violation of the rule on his part, as it was found that the foreman had not acquainted his men with such specifications. In the second place, he was not wearing rubber gloves in handling energized primaries, which is a universal rule throughout this particular company. When questioned as to why he had not required that this be done, the foreman said some of his men had been doing similar work previously, and he had left it to their good judgment about wearing the gloves, and if they got hurt it would be their fault. In the third place, the two other employees who were present at the time of the accident did not know how to revive the man. When questioned on this score, the foreman said that these men had only been employed fifteen days, and while he knew that it was a standard rule with the company that the foreman should teach the new man the Prone Pressure Method of Resuscitation before he assumed any of his duties, yet he had been so busy that he just did not have time and had put it off till a later date. The removal of any one of these three causes might have saved the man's life, and each remedy certainly was not only within the bounds of jurisdiction of the foreman, but should constitute the elementary principles of a foreman's duties. The fundamental causes of this accident were lack of proper instruction and violation of rules, the result may be classified under electricity, while the effect was death to the employee. Does it not appear, therefore, that the prime need is a correct diagnosis, and that the proper knowledge of causes usually carries implicitly a suggestion of the cure?

ANALYSIS OF ACCIDENTS

While the new classification of accidents based on fundamental reasons has not yet been adopted by all member companies, many who have adopted it have found that it is of great help. Chart No. 1 shows an analysis of a number of these accidents. Possibly the item "poor judgment" may have been overworked, due to the tendency to use this as a sort of miscellaneous item. Nevertheless, it will carry a fairly large percentage, as many accidents which deal with the "human element" cause will come under this heading. Therefore, it presents a new problem to solve—that of dealing with mental causes of accidents. A valuable contribution toward the study of mental problems in accident prevention has been re-

cently made by the publication of Boyd Fisher's book, "Mental Causes of Accidents." Every man interested in safety work should own and read one of these books.

CHART NO. 1.

1,214 MINOR ACCIDENTS, 724 DISABILITY ACCIDENTS, AND 6,867 DAYS LOST, ANALYZED AS TO FUNDAMENTAL CAUSES, SHOWING THE PERCENTAGE CHARGED TO EACH.

	Minor Accidents	Disability Accidents	Days Lost
Poor judgment.....	29.2	31.8	30.9
Contributory negligence of others.....	12.8	11.5	14.4
Haste.....	6.6	10.1	8.9
Mechanical manner of doing work (lack of concentration).....	13.4	9.8	8.4
Method pursued not suitable for work.....	5.2	5.7	7.6
Rules or instructions not observed.....	3.4	6.1	6.0
Lack of proper inspection and maintenance (defective tools, materials and devices).....	6.4	6.5	5.4
Conditions beyond control (a) Elements (b) Non-industrial.....	17.8	8.4	5.1
Lack of proper instruction.....	1.7	1.7	4.3
Physical condition of injured.....	1.2	3.7	2.8
Protective devices not provided.....	.5	1.1	2.4
Protective devices not used.....	1.2	1.7	2.4
Improper tool or device.....	1.2	1.2	.8
Willfulness.....	.1	.4	.4
Class of work beyond physical or mental ability of injured.....	.2	.4	.2
Intemperance.....	...	...	...

Chart No. 3, at the close of this report shows that, under the original classification, 23.5 per cent of all the reported accidents involving lost time were charged to "Slipping, Tripping and Falling," 20.4 per cent to "Electricity," and 28.2 per cent to "Handling Material." A knowledge of these facts, however interesting they may be, is not helpful to the safety engineer in preventing accidents. Moreover, these might properly be termed the result rather than the cause. The cause may be due to the lack of proper inspection of a safety belt—the result may be a fall from a pole.

SLIPPING, TRIPPING AND FALLING

	No. of Lost Time Accidents	No. of Days Lost	Fatals
(a) Falls from poles.....	524	14,671	12
(b) Falls with poles.....	112	3,797	3
(c) Falls into holes or excavations....	152	1,915	1
(d) Ladders.....	411	6,283	2
(e) Slipping or Tripping.....	1047	14,927	0
Totals.....	2246	41,593	18

Under the classification "Falls from Poles," the severity in 14,671 days lost and 12 deaths is quite a figure and one that should be discussed. The responsibility for (1) defective climbing equipment, (2) condition of the pole, (3) the unsafe habits performed while at work on the pole or in climbing same may rest on either the workman or his supervisor.

A gaff in a climber has been used so long that it becomes short. It is not long enough to penetrate through the rotten sap ring of the pole and secure a good hold, and down comes a lineman. Even as small an item

as an improperly sharpened gaff has caused a fatality. If the gaff has a curved surface at the point and, when a lineman comes down a pole, if the curved point hits a tack, nail head, or hard knot, the tendency is to throw the foot out and the knee in toward the pole with the great possibility of a fall. A few falls were reported and caused from the snap coming out of the D-ring in safety belts. Either the belt was not properly made, (and complete specifications for the make-up of safety belts may be found in the report of the Accident Prevention Committee of the National Electric Light Association for 1920), or the lineman had never formed a safe working habit of making sure that the snap was secured in the D-ring before leaning back for a test. Periodic inspection of some nature of all climbing equipment and tools should be compulsory in every company, large or small.

CONDITION OF POLES

While the condition of the pole many times may be the direct cause of the accident, due to its becoming rotten or full of cracks, yet many of these are given conditions and cannot be eliminated. The lineman must take these into consideration.

Then, there is a certain amount of pride almost every lineman takes in performing his work on poles. Sometimes he tries to show his ability and see how few steps he can take in coming down a pole. Very often this haste results in a fall. But the greater number of accidents of this nature may be charged to the habitual or mechanical manner in which the employee is doing his work. A lineman, in shifting his position on a pole, does not always stop to think that he must put this foot in that position and look to see that he does it. Doing this kind of work day after day, the changing and shifting around on a pole soon becomes habitual with him, and if a safe working habit in doing this is not formed at the beginning, sooner or later that lineman is going to receive a fall.

Falls with poles are usually attributed to the failure to properly inspect them before climbing. Either the old pole is not lashed to the new one or it is not properly guyed. Most of these cases occur when replacing old poles with new ones; when the last wires are cut, the old pole falls with a workman. An accident of this nature in the majority of cases is inexcusable. It probably has already been determined that a new pole is necessary, then it should be a foregone conclusion that the old pole is not safe to climb unless properly guyed.

ELECTRICITY

	No. of Lost Time Accidents	No. of Days Lost	Fatals
(a) Flashes	84	1,788	1
(b) Accident on Voltage above 7500....	67	9,547	22
(c) Accident on Voltage below 7500....	253	24,364	53
(d) Accidents on Voltage of 110 and 220	11	324	2
Totals	415	36,025	78

Seventy-eight deaths and 36,023 actual days lost from work during 1922, resulting from electric shock, burns and flashes are figures that are staggering, more especially so when we consider that they represent only 119 companies.

The fundamental reasons for these accidents are many. Some are due to the lack of providing and enforcing standard safe operating rules. In the larger cities, accident experience has caused the establishment and enforcement of certain safety rules. Many companies which operate in the smaller cities, and some companies which operate strings of properties throughout the country, do not have many safety rules in effect. Management must first issue such vital safety instructions, which if adhered to will tend to eliminate the greater volume of accidents. These must be "hide bound" to secure results. In some companies even where safety rules are in effect, the failure to enforce them is the direct cause of many accidents. It is rather peculiar, too, when we think of the times when workmen have been fired because of lack of respect for the dignity of the boss, and then not even reprimanded because of the more important matters of violation of operating or safety rules.

A cure for many an accident may be found among the following rules. With some modification, possibly, to fit local conditions, these should be in effect universally and made mandatory, regardless of the size of the company.

(a) The wearing of rubber gloves when handling energized wires or apparatus carrying a voltage between 300 and 5000.

(b) The placing of danger signs and "hold" cards on all switches which are opened to permit work to be done on lines or apparatus and the repeating of the switching orders when given. (This rule is violated quite frequently in the smaller stations and has resulted in many accidents.)

(c) The treating of street lighting circuits as energized primaries at all times.

(d) The use of grounding clamps and cable as a supplementary measure in conjunction with chains for protective grounding of high tension lines and apparatus.

(e) The universal rule of making it the first duty of a foreman to teach the new man the prone pressure method of resuscitation before that new man assumes any of the duties, and to follow this up with periodic practice to see that he becomes proficient in his knowledge of it. (This need not necessarily apply to temporary laborers.)

SPECIFIC REMEDIES

Specific remedies possibly cannot be offered for the elimination of all electric accidents, because they do not all happen alike. Furthermore, a great number are charged to human failure, either on the part of the workman or his supervisor, rather than improper design or insufficient mechanical guarding of apparatus. Consequently, we must get some insight into the personal element.

An employee placed a ladder against the side of a station wall and climbed up to clean a window. He came in contact with a 15,000 volt bare conductor and part of the grounded frame work. He could have opened the disconnects in this circuit without interrupting service—but he didn't.

A lineman, old in the game, deliberately removed his rubber gloves while handling an energized primary. One of his feet came in contact with a grounded secondary, resulting in death.

A patrolman at an isolated switching station had occasion to do some work on a piece of equipment a short distance away. He opened the switch to kill the circuit but didn't tag it. A power customer, whose service was interrupted, called to the dispatcher, who ordered another employee to close the switch. The employee working on the apparatus was badly burned and lost six months from work.

Another employee climbed one of the poles of a substation switching structure and without glancing above to see what he was climbing into, his head came in contact with a 33 KV disconnecting switch and, even though he was resuscitated, the injuries received caused ten months' lost time.

Clearly such accidents are due to the "human element." Many similar accidents involve a mental cause which it will pay to study. A lineman received a broken back as the result of a 35 foot fall when the D-ring in his safety belt came out of the snap. He had leaned back for test, and it had held, consequently he assumed that the snap was securely fastened. However, the D-ring was only held on the hook part of the snap. When shifting his position the snap twisted out. He had not formed a habit of looking every time to be sure. The failure to form such a habit cost him this fall.

Possibly another need in the utilities industry toward accident prevention is some kind of scheme to continually impress on the new workman during the learning period the importance of forming safe working habits so that he will not be so susceptible to injury during later years. Certainly, we all agree that in our industry there are a greater number of deaths among the older men in point of service, and some of his fellow workmen usually make such statements as "he was one of the most careful men on the job" after an accident has happened. Possibly a good working habit formed early in his beginning days would have prevented the accident.

This type of accident may be charged to "poor judgment" on the part of the injured, but something must be done to better his judgment. It may appear theoretical, but apparently the only solution possible is to train each workman at the beginning so he will work safe habitually, and even though his mind may become distracted or inattentive about some tedious and dangerous work in hand, thinking possibly of some domestic trouble, a financial difficulty, or some recent event, the safe working habits he has formed will have quite a good mechanical effect and possibly keep him from getting hurt.

Sometimes workmen are hired in the presumption that somewhere they have been thoroughly trained, and so are left to follow their own inclination. Sometimes they are given a set of rules to follow, but a check up

is never made to see that they are being followed to the letter. Perhaps the foreman may speak a word on safety as he details some jobs the new man must do, and that is about all. Safety instruction given the first day is wasted unless it is repeated a good many times.

Bolling down all these facts so that they may be applied to individual companies, there are two vital remedies. These remedies are practical, for they have already been thoroughly tried out and proven successful in a number of large companies.

The first of these is the suggested remedy and its application that results from an exhaustive investigation of an accident. This covers a "multitude of sins." It includes principally the determination of the fundamental cause, fixing the responsibility, promulgating new rules, and the executive backing which is oftentimes essential and which carries great weight.

The second is the medium through which the majority of these may be woven into the industry. This certainly is the foreman's responsibility, the scope of which might include the entire field of training the workmen, the solicitation of safety help from the workman, the anticipation of accidents on the job, the issuing of special instructions for the varying conditions encountered, and the enforcement of rules in effect.

THE FOREMAN

Much has been said about the foreman. Long since has industry realized that dealing in accident prevention means dealing with men rather than with machinery or equipment. The closest point of contact with the workman is the foreman. He is placed in his position because he is supposed to be of higher mentality and possesses a broader knowledge of the business and operating methods than the men whose work he supervises. In a great many cases, however, as many of the causes of these accidents reveal, management, while admitting that the foreman is the keynote in accident prevention, has neglected to emphasize this fact to him. It has not sufficiently impressed on his mind that safety is to be made just as important as any other part of the work—to be treated on exactly the same basis—and that he is going to be held strictly accountable for accidents that happen in his department unless the investigation shows otherwise.

Were the utility industries to be revolutionized or made over for the sole sake of safety, possibly the first thought would be the culling out of those foremen who are unfit to serve in a supervisory capacity and keep only those who have the faculty for leading men, executing rules, and training workmen in efficiency and safety. But this cannot be done. These given conditions must be taken as they are and an attempt made to make them as nearly perfect as possible.

Evidently there is a greater demand for executing ability in a utility foreman and a greater need for closer supervision of a gang of workmen in a utility to prevent accidents than in any other industry. And a closer supervision means more rules in effect. It does not necessarily follow that all such rules, both major and minor, be printed and distributed among the workmen. Possibly the major ones should be, or those which

the company executives have deemed advisable to inaugurate throughout the organization and where such rules have been established and rigidly enforced, accidents have decreased materially. But it is the specific jobs, the specific work, even the regular daily work during which many different situations arise, that need detailed instructions and cautions issued. Going to the list of accidents sent in, one reads that Foreman Ross Meyers has charge of three high tension switching stations for a certain company. It is nearly time for the annual inspector to come around. Ross wants his stations to be in good condition, so, without giving any definite or detailed instructions, he merely tells Fred Taylor, a helper, to paint the 33KV oil switches and hurriedly leaves for another station. Now, Fred has only been on this job eight months. He doesn't know a great deal about high tension apparatus. He doesn't know whether this switch ought to be "killed out" or not. He finally decides to paint the switch just as it is. He gets a bucket of paint and a brush and starts to work. There is one part of the switch frame that is hard to get to. He sticks the brush and his arm between two of the 33 Kv. leads and tries to work the brush back and forth with his hands, holding his arm equi-distant between the two conductors. As one would expect, Fred fails and the result is he is in the hospital with his arm burned off. A few hours later Foreman Ross hears about it and rushes back to the hospital, wondering why the "poor fish" did not kill out the switch, or tie an insulated stick on the end of his brush. And one possibly wonders why these instructions were not issued in the first place. The remedy for this accident is certainly obvious. As to why the foreman did not issue these instructions, is another matter. His explanation was to the effect that he didn't think it necessary, as the man should have used better judgment. Too often workmen are allowed to stagger unwarned or uninstructed into ways of performing certain jobs that foster accidents.

ACCIDENT REPORTS AN INCENTIVE TO CLOSE SUPERVISION

Where a conscious knowledge exists in the mind of a foreman that he is responsible for the men in his department and where some information is constantly placed before him so that he feels that he is blamed for accidents, then, in the greater percentage of cases, he is going to give closer supervision to the work his men are doing and issue detailed instructions regarding the methods of performing their duties.

The peculiarity of the utility foreman, whether he is employed in the telephone, gas, or electric industry, when compared with a factory foreman is that his work is not measured on a production basis. No charts or cost sheets are given him that show the efficiency of his department. His work, while to certain extent routine, is very diversified. When his month's work is through, he does not see his name on any kind of statistical sheet comparing the work of his department with some other. We must not forget that he is the fellow whose men were hurt or killed and the reports of their injuries are the ones which were used to make up these accident statistics. The safety engineer who keeps a complete record of accidents reported, summarizes them by departments, showing the name of the foreman of each department and broadcasting these re-

ports throughout the company, is going to find that he is going to get possibly an equal result from the voluntary efforts put forth by that foreman to prevent accidents as the safety rules that are in effect and which the foreman is expected to enforce. Where one foreman's name appears listed along with another foreman's with the accident record of each shown, there is bound to be an incentive on the part of each foreman to get ahead of the other fellow.

Here, for instance, is Sid Thompson, an old time foreman, who has been on this particular job so long that he has almost grown stale. About half the time he appears grouchy and every now and then he has a quarrel with one of his men. He is a good lineman, and knows his business, but somehow has lost interest in his job. Only last week one of his men broke an arm when he fell from a defective ladder. The man had told Sid about the ladder, but it had not been fixed. The superintendent blamed Sid and this did not set well with him. There was a safety organization in the company, but Sid did not take any interest in it. The main reason was that the man who was in charge of the safety work used to be a claim agent and Sid felt that this man did not know enough to come around and tell him how to run the job. At any rate, in his basket one morning later, Sid found a sheet with thirty-seven foremen's names on it showing the number of accidents, days lost and other information about each department. His name was third from the bottom. Scanning over the list, he saw the names of two or three other foremen whom he knew well. They were nearly at the top. This comparison did not improve his feelings any. That night he lay awake and wondered. He felt that he was as good as any of them. The next morning Sid got to work early. Before ten o'clock he had fired one of the men for an unsafe act that Sid had told him long ago not to do, but lately he had not cared much. Now we find Sid, seven and one-half months later, almost a different man. He is fifth from the top and he and the safety men are good friends:

During 1922, new construction work in utilities was particularly heavy. This called for an influx of new men, many of them untrained, and the resulting accidents to these new men are reflected to quite a staggering degree in the number of severity of accidents reported by the various companies. Furthermore, it is quite obvious that there is need for greater training of workmen in the utilities industry than in any other kind of industrial concerns. This is evidenced by the proposed training plan that will soon be recommended by C. B. Scott's Committee on Accident Prevention, of the National Electric Light Association. It would be an error to assume that training of a new man in the proper and safe way is going to be accomplished unless the foreman has the right attitude; that he undertakes this with a spirit of interest; and that he takes the initiative and originates many of the instructions and warnings given. During the learning period, an extra degree of attention is needed to assist the workman in forming habits of safety. Many an accident was reported due to a workman failing to see if all three blades of an air switch were open, or if the snap was securely fastened in the D-ring of his safety belt and many others where correct habits were not formed in the beginning.

THE INVESTIGATION

One very surprising fact determined from these reported accidents is that the majority of cases after an accident has happened a thorough investigation is not held to determine the true cause and fix the responsibility. It is true investigations were held, but usually by the insurance company adjuster or by a representative of the accident commission to determine the beneficiary or the extent of the injury. It is not the purpose of either of these concerns to suggest remedies and apply cures. They are not as greatly interested in the prevention of the accident as they are in getting the claim settled.

Many companies, however, do make rigid investigations of all important and even near serious accidents where death or a severe injury could have resulted. The primary purpose is to bring out suggested plans for the future safety of employees. Again it is a great factor in putting accident prevention on the same plane as other phases of the work. Successful accident prevention work must be based on actual accident experience and an investigation provides the means of gathering all the facts. In any organization there is no question as to the psychological effect on the minds of the employees by conducting a thorough investigation. It has the tendency to impress on them the close relation between the elimination of accidents and efficiency in their work, and that a careless act is treated in the same category as poor work. It brings recognition of the importance of making safety a vital part of the daily routine, and possibly the fear of the consequences of an investigation. Safety is thus woven closer into the fabric of the business.

The importance of the accident has a bearing, of course, on who should make the investigation. It may be the foreman, the safety engineer, a representative from the safety department, an employee's safety committee, or a general board of inquiry.

In those companies which have established well worked out investigation plans and who are obtaining the results hoped for, the general procedure is to question those who were present when the accident happened and to leave nothing unturned, to get to the very bottom of the matter and study all contributing causes, to examine any apparatus or equipment involved for any possible safe rearrangement or safeguarding, to seek for an improvement in forming safe working habits, to look for personal factors that may have led the workman to become careless or inattentive, to shield no one, to enter into the spirit of the investigation with justice and firmness to all, but with the determination to seek the basic causes and impose such penalties, or promulgate such plans as will prevent recurrence. Such an investigation is a real remedy. And when the findings of the safety engineer, or the board of inquiry, as the case may be, of the more important or fatal cases are presented in a clean-cut analysis form to the general manager, his clear vision and keen judgment in matters of decision or admonishment will at once lend added strength to the prestige of safety throughout the organization.

No better plans for making thorough investigations of accidents can be offered than those submitted in the recently published Safe Practice

Pamphlet No. 56, of the National Safety Council. It embodies the purpose of the investigation, by whom made, cases which should be investigated, fundamental causes of accidents, and penalties imposed. If such plans, or similar plans are put into effect in many member companies, the results of the investigation will reveal many surprising facts as well as many suggestive remedies.

For the benefit of those companies which have been following the original classification of accidents as to immediate causes, Charts 2, 3, and 4 give an analysis of the reported accidents according to this classification.

CHART NO. 2.

9,400 REPORTED ACCIDENTS INVOLVING LOST TIME, ANALYZED AS TO IMMEDIATE CAUSE.

	No. of Ac-	Per	
	cidents	Cent	
Trench Cave-ins	34	.4	■
Injured by Animals.....	64	.7	■
Gas Explosions	69	.7	■
Overcome by Gas or Heat..	137	1.4	■
Machines in Motion.....	239	3.1	■
Falling Objects	405	4.3	■
Electricity	415	4.4	■
Eye Injuries.....	418	4.4	■
Nail Injuries	467	5.0	■
Moving Vehicles.....	743	7.9	■
Miscellaneous	990	10.5	■
Handling Tools	1,040	11.1	■
Handling Material	2,083	22.2	■
Shipping, Tripping, Falling.	2,246	23.9	■
	9,400	100.0	

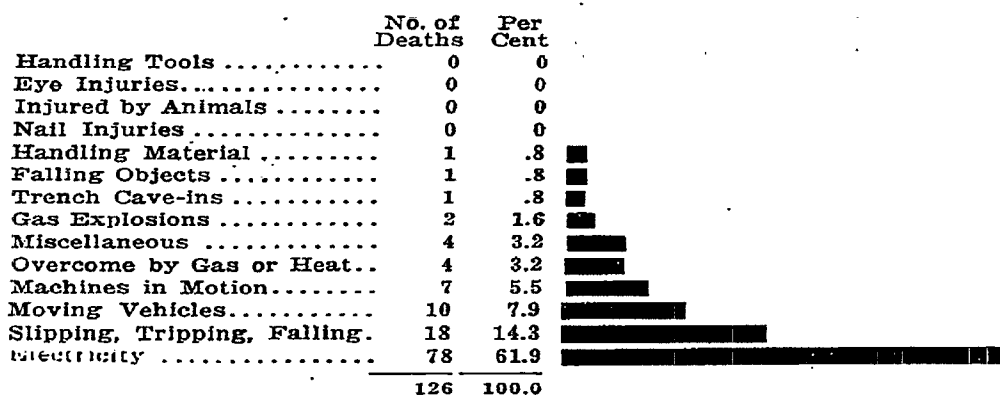
CHART NO. 3.

179,941 ACTUAL DAYS LOST FROM WORK ON ACCOUNT OF ACCIDENTS, ANALYZED AS TO IMMEDIATE CAUSE.

	Days	Per	
	Lost	Cent	
Injured by Animals.....	956	.5	■
Gas Explosion	1,483	.8	■
Overcome by Gas or Heat..	1,629	.9	■
Trench Cave-ins	1,647	.9	■
Nail Injuries	2,531	1.4	■
Eye Injuries.....	2,720	1.5	■
Machines in Motion	5,155	2.9	■
Falling Objects	5,246	3.0	■
Moving Vehicles.....	6,353	3.6	■
Miscellaneous	10,858	6.2	■
Handling Tools	10,871	6.2	■
Electricity	36,023	20.4	■
Shipping, Tripping, Falling.	41,593	23.5	■
Handling Material	49,876	28.2	■
	176,941	100.0	

CHART NO. 4.

126 REPORTED DEATHS ON ACCOUNT OF ACCIDENTS, ANALYZED AS TO IMMEDIATE CAUSE.



DISCUSSION

Mr. H. W. Moses (Superintendent, Bureau of Employment, Edison Electric Illuminating Company, Boston): In spite of all the statistics that the Accident Prevention Committee of the National Electric Light Association have gotten together in the past few years, they haven't been complete enough to permit of the comparison that is now made possible through this report and the tabulation. I know what a tremendous job it has been to get the answers to these questionnaires and to tabulate them in some form that is comparable and worth while.

When you look at the statistics presented on the first page of the report, the thought that comes over you naturally is that our success during 1922 hasn't been very great in accident prevention work, and that the results have been rather appalling, and pointing out a tremendous amount of work yet for us to do. But when you look at these figures from the point of view of the average of 119 companies, they are really not so very bad, because the death rate is about 1.06 per company per year; that the accident cases reported run about 4.7 per one hundred employees; the lost time cases about 37 per cent of the total cases reported; that there was one lost time case for every 12.7 employees; that there was 1.48 days lost per employee per year; and 18.8 was the average days lost per case. And that, surprising as it may seem, is pretty near the average of the Boston Edison Co. for 10 years. I tried to estimate what this was in dollars, and I stopped figuring when I got somewhere over two million. It is a relatively large sum.

Another important feature of the report points out that while only 4.4 per cent of the cases analyzed were due to the electrical hazard, yet they caused 20.4 per cent of the days lost and 61.9 per cent of the fatalities.

In discussing the remedies, there were three pointed out, and, in the order of their occurrence, it seems to me they are: the foreman, the investigation and the classification which results from that investigation.

In considering the foreman, in view of what has been discussed at these meetings in past years, it seems rather unnecessary to repeat any of that excellent subject matter, but to look at it from a little different angle, we are led to ask ourselves: What is it really that makes a foreman a foreman? Is it due to his experience and as a recognized leader of men? Is it due to his length of service with the company? Is it due to some sentiment, or is it due really to pull? And back of all this comes the vital question of choosing the proper employees at the start, when they are newly introduced into the company, long before the occurrence of their becoming foremen.

ADVISABILITY OF PHYSICAL EXAMINATION

This gets back to the advisability of physical examinations of new employees to determine their physical fitness for the jobs which they undertake, and as physical examinations grow in industry, while I appreciate it is going to make some problem for the discards, a charge on the community and on society, yet the time is not far distant, I believe (by that I mean five or ten years hence) when those companies who do not select employees through the physical examination process are going to find themselves in the position of taking discards from the industries that do use the physical examination.

There are very many ways to choose men, and a physical examination may be expanded to a very useful degree.

There is a very interesting discussion in a new booklet on that subject that has just been issued by the National Industrial Conference Board.

We are beginning to hear more and more in industry about psychological tests. They have been used with great success in some branches of our own industry, notably the General Electric Co. in Lynn. I believe, too, in selecting your foremen for the relatively higher positions, that some spirit of composition for promotion should enter in, perhaps based on the general civil service plan. Length of service isn't necessarily the only basis on which to promote a man.

As to the investigation, it appears to me that the all-important factor of investigation is the promptness with which it is done, before the witnesses and before the man himself has forgotten really what happened.

I believe, too, in publicity within the company is a great curb to the spread of industrial accidents. Statistics can be circulated around the company bulletin boards.

The make-up of the investigating committee is rather important. Usually it is composed of busy men; it is difficult sometimes to get them together; they are not always on call to go out to the serious accidents that happen out of office hours and at a distance from their respective homes.

We followed the practice in Boston with some success of having a different committee investigate each accident, that is, a specialist in the particular line which caused the accident is the chairman of that committee. For instance, if we have an automobile accident, the man who is the chairman of the investigating committee is the superintendent of the transportation department, not necessarily a member of the accident committee, but asked by the committee to serve, and he appoints whoever he wishes to serve with him and make a report to the general committee. If it is an electrical accident, the superintendent of the electrical engineering department, a man duly qualified by experience and knowledge of the company's system and method of operation, is invited by the committee to act as chairman of the investigating committee. That gives us first-hand knowledge from an expert point of view, and ties in a different crowd of fellows with every investigation, so that it is generally known throughout the company that these little committees of three or five are functioning, and that they are investigating something that has happened that has resulted disastrously to a fellow-employee.

THE DIFFICULTY OF SECURING STATISTICS

In a recent report of the U. S. Commissioner of Labor Statistics, he says: "It is not greatly to the credit of our people that nobody knows with any substantial degree of accuracy how many industrial accidents occur annually in the United States. Based on incomplete data the Bureau of Labor Statistics estimates the total number of disabled work accidents as approximately two and a half million annually." I simply quote that to illustrate that an important organization whose sole duty it is to deduce statistics have not yet been able to find any standard method or any proper method that puts on a comparable basis the statistics of different industries in different states, and that is one of the big jobs that the compensation accident commissioners are up against just now. Their method of compiling statistics in the different states does not permit of any reliable basis of comparing results in one state and another, between one industry and another, if they are located in different states under different jurisdictions.

We quite readily place a lot of the blame, I think for accidents on the man, whether we be workmen or whether we be foremen, particularly on the new man, and there is somewhat of a question, it seems to me, on just how far discipline can be carried.

It doesn't take a student of accident prevention very long, in classifying causes of accidents under any classification to recognize that the lineman is the big hazard of the industry, and that the handling of electricity in all its component parts is our real hazard. Now, if discipline is to be a remedy, just how far can we apply discipline?

As I know linemen, there is always a shortage of them. You have got to take into account supply and demand, and they are not the type of people you can exploit very much. If you do, they are moving on to the next town, and their roving characteristic is to see the world.

Further, it seems to me there is a certain economic side of accident prevention. We sometimes overestimate the limits to which we can go with economy. Perhaps there ought not to be such limits, but we had a problem of a series of accidents in our boiler-room which were directly traceable to improper shoes that the firemen were wearing. They were wearing a very much dilapidated, down-at-the-heel, out-at-the-toe and through-at-the-sole type of shoe, which had passed their usefulness, but they were worn in the fire-room because they were comfortable. We had a lot of accidents, or it seemed to us that we did, because they all came in a bunch, so we investigated with the idea of recommending to the generating department that they supply their firemen with shoes. We found that in five years we had had 26 accidents due to wearing improper shoes in the boiler-room, resulting in about 300 days' loss, which, roughly, in dollars, was about \$375 a year. But if the generating department were obliged to buy shoes for 80 firemen, estimating two pair a year would be necessary, the cost of the shoes was going to be \$900 in order to save \$375, so it seemed as if there was some economical point beyond which you could not reasonably be expected to go.

All we can reasonably expect, it seems to me, in classification, is to point out something that is useful to ourselves, first of all, is useful to the industry, and especially useful in making it possible to make reliable comparisons with one another.

PRIMARY AND SECONDARY CAUSES

Harry Lucas (Treasurer, Philadelphia Electric Company, Philadelphia: Since our object is, primarily, discovering and applying a "remedy" it would seem that too much stress need not be laid upon the fact of whether we might call the cause primary or secondary, fundamental or resultant.

Taking this view of the situation, it may be of advantage to analyze accidents with a combination of primary and secondary causes, so as to apply a remedy that may not be called a cure but that will have the effect of alleviating the situation. This is the procedure in the treatment of bodily diseases.

It is evident that the Herculean task of making over all employees both physically and mentally is one that few companies would care to undertake, even if armed with a full knowledge of the psychological and mental causes of accidents.

It behooves us therefore to "make" or "make over" the foremen and supervisors who handle relatively small groups of employees and who can do the necessary educational work to make them safeworkers or, if they possess traits that indicate intemperance, lack of concentration, poor judgment, wilful indifference, or physical or mental inability to sift them out and secure a working group that possess the qualifications necessary to make them desirable as Public Utility Company workers.

For as has been brought out by the authors of this report, the necessary diversity of work for the average electric utility worker proves that such workers must be intelligent and realize that temperance, concen-

tration, good judgment, interest in their work, the best of attention to physical and mental health are attributes of the men who "get there," in the electric industry. Such qualifications are of course worth better material recognition than the wage paid to the other type of worker, but there can be little doubt as to the wisdom of the employer in buying the service of such workers, quite as much so as in the buying of high-grade material for the work being performed.

Some foremen or supervisors are indifferent to the needs of the situation and therefore devoid of a sense of the responsibility of their jobs. An alert division head can quickly straighten out such indifference on the part of supervisory forces, as the vast majority of men in supervisory positions possess a degree of intelligence that naturally makes them appreciate the fact that accidents to their men constitute a serious reflection on their ability as supervisors. This, in itself, insures cooperation from that angle, although it is of advantage to, from time to time, give them information relative to the standing of their group as to total accidents, lost time accidents and rate per 100 employees. Thus may their interest be made constant. Failures on the part of supervisors to measure up to their responsibilities in accident elimination work, fully justifies demotion.

So much has been written regarding the foreman, that he seems to be the pivotal figure around which accident prevention work centers. The safety talks to the foremen and the men, the screen pictures showing proper and improper methods, the bulletins issued regularly to all the foremen and employees, are primarily to hammer safety home to all, but they carry a special and an individual lesson to the foreman.

I differ with the statement that the management neglects to emphasize to the foremen the necessity of safe practice. In our company, and I am sure it must be true of other companies, safe practices are constantly being impressed on him and fines, reprimands, lay-offs, and dismissal are his lot if accidents to his force indicate indifference and carelessness.

A most effective manner to fix in his mind the importance of safe practice is to lay him off for the same number of days the injured employee is incapacitated, that is, if the period is not too long.

We find we have but a few cases each year where such stringent enforcement of discipline is necessary, but our supervisors know that we look to them to minimize the accident situation, and they, for the most part, prefer to cooperate fully in the matter rather than be censured for indifference to so important a matter as safeguarding the men under them.

ELECTRICAL ACCIDENTS COST MORE

Mr. Wills MacLachlan (Toronto, Canada): One reason why we are all teaching the Prone Pressure Method of Resuscitation is because we find that although only eight per cent of the accidents are electrical, yet they cost possibly 75 per cent of the compensation. That is based on the old type of the classification.

Mr. R. A. Bloomsberg (Utilities Insurance Co., New York): I don't altogether agree with Mr. Rutland's statement that insurance companies do not make investigations of accidents, because that is one thing we do with fatal accidents. We get a man there within 24 hours, and we get every possible fact that can have any bearing. That is an engineering investigation I am speaking of now, and we have found out some very interesting facts in connection with some of these investigations.

Mr. Rutland also referred to this question of classification. That is something that we have been giving considerable thought to recently, from a little different viewpoint. The system which Mr. Rutland has outlined I think is a fine thing for an individual company, not so much because it has what might be termed an absolute statistical value, but because in that particular company it is placing the emphasis upon certain conditions which must be watched. It will be a little difficult, I am afraid, to compare the figures for one company, where you will have one man investigating the accident with certain ideas and tendency to draw certain conclusions, with the experience of some other utility company, and when you attempt to do that there may be difficulties.

ELIMINATION OF HAZARDS IN BY-PRODUCT PLANTS

**JOHN F. O'MALLEY, SUPERINTENDENT, EMPIRE GAS AND ELECTRIC COMPANY,
GENEVA, N. Y.**

The elimination of hazards in by-product plants is a subject of much interest to all of us, because it effects men, and manpower is not only vital to our industry, but to society as well.

Mr. H. O. Palmer, vice-president of our company, recently stated that any man in our business of public utility with a responsible position should be a better man than one in a comparable position with any other industry, and I believe he is right. Such a condition is made possible by education and experience. Elimination of hazards is applicable in the same manner. We know that, of all accidents, the larger percentage could be avoided if these people did some real thinking in time, and thinking, as we know, is the hardest thing for some people to do.

The viewpoint of the management is highly important; to be permanently successful it must think, act, and show by example in and out of working hours its worthiness to have the confidence of its men. The men must believe in it. The management is responsible for the thinking processes of its employees.

It is my opinion that the elimination of hazards should start when the man is employed and the matter kept fresh in his mind. In this respect, it is much like advertising, as it must be kept before him until the man is thoroughly sold, at the same time having in mind that no sale is entirely satisfactory until all concerned are satisfied, and that that which has been acquired is of value for the price paid. If the price of freedom of accidents is education, let us have that proper education.

In connection with this same thought, there is another important matter that we know to be true and should be given the attention it requires. We know that if a person is to be successful in accomplishing something,

the first requirement is interest. He must be interested in it, and there are many reasons why any one should become highly interested in this subject, both from an employer and an employee standpoint.

We who operate by-product plants know that our industry has made vast strides forward, and is producing necessities on a large scale that have become highly important in the progress and development of all classes of people. An industry like ours must be solidly built, and manpower, which is the most important power, must be trained and safeguarded in every possible way.

It has always been my opinion that the right man in the right place accomplishes wonders in work, and likewise, in elimination of hazards, and I believe that it is one of the biggest things we can do for the man. If a man does not like his job and the kind of work that he is doing, he is a misfit. Imagine a man in this position and see how much interest he has in himself and what is going on about him. He becomes mentally and physically lazy. He is one of those who becomes bored if you talk Safety to him or show him a safety bulletin. He may agree with you, but he goes on taking the same old chances. A good many times much can be done to help this man find himself by placing him in more adaptable work in which he can become interested. If this cannot be done we are doing him a service to tell him so, and allow him to find employment elsewhere.

RIGHT LIVING AND THINKING, PAY BIG DIVIDENDS

The man who is frequently found on the accident list is the one with the single-track mind. The particular line of thought varies with the individual. His mind is not on the job. He may be worrying about his family or thinking of the good time he had the night before, or what he is going to do that night, or of a multitude of other things. He is engaged in doing work that requires that he give it his thought and attention, and his thoughts are far from it. He does not pay attention to Safety rules, because his mind is filled with other things. He is wandering away mentally, and he is a bad risk.

As previously stated, we want in our industry real men, men who appreciate that right living and right thinking are big dividend payers in good health, which is essential. A man of this type who is interested and satisfied with his work has the spirit of contentment, but not that of safety and his name is seldom found on the list of accidents.

I appreciate that many times when we want men, that we cannot get a man made to order, and this condition of the right man for the job cannot be accomplished in a day. It may take some time but is of sufficient importance to keep in mind, so that eventually it may be accomplished.

Foremen and department heads form an important part of the safety organization and these men must be thoroughly sold on the idea of Safety. In many respects they are the company.

The various operations and departments are classified for accident prevention. Our rules are directed to the men. In these rules, the particular hazards, and their elimination, in the various departments are set forth.

The safety committee consists of three men from our own organization and this committee makes regular inspections of the entire plant and reports their recommendations to the safety engineer and the superintendent. The safety engineer tabulates these, each recommendation on a separate report and forwards to the superintendent. When completed these reports are returned to the safety engineer. The personnel of the committee is changed from time to time and works out well, as it gives a larger number an opportunity to take an active interest in the work.

RULES FOR DESIGN, PURCHASE AND CONSTRUCTION

1. *Orders for machinery* should have safety appliances incorporated in their specifications.
2. *All drawings* should be checked for safety precautions before they are issued.
3. *It should be* the duty of inspectors, constructing engineers and superintendents to see that all safety devices are applied, and all safety rules are complied with before apparatus and machinery are put into operation.
4. *Belts and pulleys* shall be so located as not to be dangerous to workmen, or shall be properly enclosed, fenced or otherwise guarded.
5. *Valves* shall be so located as to be readily accessible or permanent ladders, stairways, or runways from which they can be readily reached shall be provided.
6. *Fly wheels* should be properly fenced or guarded.
7. *Gears* should be protected by guards of approved design.
8. *Shaft couplings* should be protected by guards.
9. *Keys* should be cut off flush with the shafts or housed.
10. *Collars* should be of the safety type with countersunk set screws.
11. *Set screws* should be of the countersunk type wherever possible, or be guarded.
12. *Emery wheels* must be provided with a hood and goggles.
13. *Keyways*, when exposed, should be filled up.
14. *Walks* should be provided where it is necessary to oil shafting while running. Shafting on wall brackets or otherwise, placed so that when oiling from ladders is necessary should be properly guarded.
15. *Charging cars* should be equipped with wheel guards or hoods so arranged that they will push any object off of the track instead of running over the same. They should also be provided with an automatic alarm to sound whenever the car is moved.
16. *Electric locomotives* should be equipped with alarm bells and whistles. Bells should be so arranged as to ring whenever the car is moved.
17. *Pushers* should be provided with automatic alarms arranged to sound whenever the car is moved.
18. *Hand rails* should be made of pipe not less than one and one-fourth inch and must be bolted to floor or set in sockets. Use no wood screws.
19. *Wooden handrails* should not be used for other than temporary work.
20. *Handrails* should be provided on all platforms, embankments, walks or stairways.
21. *Toe boards* not less than four inches high should be provided on all platforms, stairways or runways which are ten feet or more above the ground or floor.
22. *Stairways* should never be made with irregular risers or treads, or of a greater angle than 50 degrees with the horizontal. Where greater angle is necessary use ladders.
23. *All permanent ladders* should be made of iron.
24. *Water gauges* on boilers and apparatus under pressure should be equipped with safety guards.
25. *Counterweights* should always be housed.
26. *Exhaust pipes* should never be allowed to discharge in a horizontal direction or at less than seven feet from the ground.
27. *Manhole covers* should be designed with their least diameter greater than the greatest diameter of the opening they cover, or must be hinged in place.

28. *Open Sewers, pits or dumps* must be properly railed or covered with covers of approved design.

29. *Platform, stairways, etc.*, more than seven feet above the ground must be provided with double pipe handrails.

30. *Clearances* of ample width must be provided along and above the entire paths of any traveling machine, such as charging cars, locomotives, cars, pushers, trippers, etc.

31. *Scaffolds* should be built with no lumber less than two by six inches. Where wooden hand rails are placed on same, they must be inside and not outside of uprights. Toe boards should be provided on all scaffolding on which brick or similar materials are to be handled.

32. *Safety gates* or doubling acting spring hinges should be provided for dangerous crossings.

33. *Iron floor plates* must not be smooth. Use checkered or otherwise roughened plates.

34. *All hooks* used for hoisting should be of approved design.

35. *Doors* on all buildings where there is possible danger from escaping gases or fire should be made to open out. Such doors should be fastened shut by counter-weights or springs. It should not be necessary for a man to find a knob or latch when endeavoring to escape through darkness, smoke or a blinding gas.

36. *Approved wiring*, switches, and vapor proof globes should be provided in all by-product departments, purifying house, coal and coke handling departments or in any department where dangerous gas or inflammable material is manufactured or used.

37. *Steam jets* should be provided on stand pipes to eliminate hazard from gas flashes.

RULES FOR FOREMEN

1. *Have a thorough understanding* of all rules. Until you know them all and are living up to them you are not doing your full duty.

2. *You will be held responsible* for accidents to your men.

3. *You should caution* your sub-formen regarding the preventing of accidents.

4. *Watch out for men* who are hurt frequently, either by carelessness or bad luck, and put them where they will not get hurt.

5. *You must not put men* to work on any job until you have satisfied yourself, by personal inspection, that the place is safe. You must warn men of any danger that may come up in the course of doing this work. If, on returning, after you have been away, you see a man violating instructions or taking chances that makes him or others liable to injury, deal with that man so as to make certain he will not again disobey orders.

6. *Use judgment* at all times in placing men on jobs; heavy, slow men should not be placed on jobs where light, quick men are required. Slow thinking, unintelligent men, should not be placed on or around machinery where presence of mind is required for, by so doing, the probability of accidents is increased many times.

7. *If machinery, tools* or other appliances, with which you or your men are working are dangerous, do not continue to use them, but call your superior, if other tools or appliances cannot be immediately procured.

8. *When you finish* a job leave the conditions safe, replace safeguards and do not leave loose material overhead or where men are liable to stumble over it.

9. *Drill your men* to notify you at once when injured, no matter how slight the injury may be.

10. *A foreman's accident report* must be made out for each and every accident, telling how the accident occurred, and names of all witnesses. Also, what caused the accident and how similar accidents can be prevented in the future. Ask this question of yourself: "Could I have done anything to prevent the accident?"

11. *Investigate every accident* occurring to your men and try to prevent another accident occurring in a like manner.

12. *Never have a man* in your employ with whom no one can talk.

13. *Injured men* should not be allowed to go to the doctor unassisted where the injury is other than of a very minor nature.

14. *Foremen* on one shift must report to and discuss with foremen on the other shifts accidents they have had with a view of preventing like accidents.

15. *When it is necessary* for men to work above other men, those working underneath should be notified of the fact. When it is necessary for men to work underneath other men, those overhead should be notified of the fact.

16. *In the process of new construction or repairs, the surrounding premises should be kept clean and as orderly as possible. Boards with nails sticking up must not be left lying around.*

17. *No person should be allowed to operate traveling machinery of any kind without being authorized by the proper authority.*

18. *Make it your personal duty to see that all safeguards and signs, installed to promote safety, are in place and in good condition.*

19. *When repair men or men of other departments are doing work in your department, see that they observe all rules of safety. You are responsible for the conditions in your department.*

20. *Never send a man into a bin or hopper containing coal or other material unless he has the assistance of another man and a rope tied around his body under the arms. Be sure that the assistant stands in a safe place and has his end of the rope attached to some fixed object.*

21. *Do not allow loose material to lie around. A large percentage of accidents is caused by men stepping on or stumbling over material or objects which should have been removed.*

22. *All fly wheels and large pulleys in your department should be inspected at regular intervals for possible defects or cracks.*

23. *Every foreman must know the location and use of the emergency medicine cabinet and its contents and their name, and know how to get the assistance of the regular doctor and hospital, and must know who to call if the regular doctor is out.*

24. *Never send a man into a tank, boiler, apparatus, or vessel of any description without having a man outside to watch for his safety. If there is known possibility of danger, have him tie a rope securely under his arms before entering.*

25. *The prevention of accidents is one of your most important duties.*

26. *Make it your duty to see that all dangerous places are well lighted at all times. Many places which are safe in daylight or safe for men familiar with them may be extremely dangerous to new men when it is dark.*

27. *Before crossing tracks: Stop, look and listen.*

28. *House cleaning conditions must be watched carefully. All departments should be kept clean and free from all accumulation of waste materials. Clean up after each job.*

RULES FOR COKE OVENS

1. *There is danger in passing under moving machinery, from falling objects, or broken parts of machines.*

2. *Before moving pusher, charging cars, or quenching cars and locomotives, be sure no one is in a position to be injured.*

3. *Attention is called to the danger of coming in contact with electric power wires or rails supplying power to pusher, charging cars and electric locomotives.*

4. *Do not open or shut any gas, steam, liquid or other valves or electric switches, unless it is your duty to do so.*

5. *See that all shafting and gears are properly guarded at all times, and that all handrails are in place and safe. Report all dangerous places to your foreman at once.*

6. *Never throw objects of any nature from the top of the ovens or platforms without first making sure that no one is in a position to be injured.*

7. *In oiling or working around machinery, do not wear loose or ragged clothing; be sure your sleeves are tight at the wrist.*

8. *When closing, opening or cleaning charging holes and stand pipes, work on the side from which the wind is blowing. When gas or smoke is escaping from an oven, remember it may ignite at any moment, and may cause painful burns.*

9. *Never stand in front of the oven doors when they are being raised or lowered. If necessary to steady them do so with a shovel and stand to one side so that, if cable or hook breaks, the door will not fall on you. Door holsters must inspect cables and hooks each shift before starting work and report any signs of failure or weakness to foreman at once.*

10. *Be sure that the platforms on the pusher and discharge sides of the ovens are kept free from loose coke or other material. A stumble may be fatal.*

11. *Never ride on pushers, charging cars, locomotives, or quenching cars unless it is your duty to do so.*

12. *No one but the regular operators shall move or operate any pusher, charging car, locomotive or other machinery about the ovens unless instructed to do so by the foreman in charge.*

13. *Gas may kill you.* Dangerous gas may be found anywhere. Sometimes you cannot see or smell it. It may make you unconscious before you know gas is present. Sometimes gas makes you feel dizzy or gives you a headache, stiff neck, or weak legs. When you feel any of these symptoms, get into fresh air.

14. *Do not go into* any building or into any part of the works where your duties do not take you.

15. *Never enter a tank* or other apparatus without orders from your foreman, and without another man outside to watch for your safety.

16. *Flue men* are cautioned against the danger of ashes, when the peep-holes are first opened for inspection of flues. Do not get your face too close to the same.

17. *Do not place hands* on door of hoist cables while they are in motion.

18. *Before crossing tracks, STOP, LOOK and LISTEN.*

19. *When ovens* are taken out of operation care must be exercised to see that fuel gas is shut off and no gas is allowed to enter flues. This is important.

20. *All gas holders* must be inspected and kept in good working order and kept well painted.

21. *Platforms, steps, railings* and ladders must be kept in constant repair and safe at all times.

RULES FOR YARD AND RAILROAD MEN

1. *All excavators* should be guarded by barriers and by lights at night. All excavations that are liable to cave in must be shored up.

2. *Always be sure* the tools and appliances you are working with are safe.

3. *When unloading cars,* be sure that the material is piled or placed at least six feet from the nearest rail. If it is not possible to do this, place a warning sign at each end of the pile. Any material spilled along the track must be immediately cleaned up. A stumble is sometimes fatal.

4. *All trains* and locomotives must move with caution throughout the plant, and must be under the control of the operator at all times. All trains must be operated with the expectation of finding obstructions or men on the tracks at any point.

5. *Every train* consisting of one or more cars, when in motion, must have a man on the end toward the direction in which it is moving, except when moving with the locomotive ahead.

6. *Locomotive crane men* must follow the rules for regular train crews when operating throughout the yard.

7. *Switchmen* must see that all switch points fit properly.

8. *No person* whose duty does not require it will be allowed to ride on locomotive or train.

9. *In all cases of accidents* and damage to equipment or cars, report must be made to the proper authority at once.

10. *Flying switches* are positively prohibited.

11. *Trains* must be brought to a full stop before cutting cars loose from engine.

12. *Switchmen* must not move improperly loaded cars, or cars which cannot be safely handled to destination.

13. *Every workman* before going on any scaffold of any description must see for himself that the scaffold and its supports are properly built. Sufficient time will at all times be allowed to each employe to make this examination. He is forbidden to enter upon any scaffold of any description until he has satisfied himself by such personal examination that it is safe.

14. *Before crossing tracks: STOP, LOOK and LISTEN.*

15. *Do not wear* loose or ragged clothing around moving machinery. When working on same be sure your sleeves are tight at the wrist.

16. *When coaling up* locomotives, coal should not be piled up high so that lumps will roll off when the locomotive is in motion.

17. *When repair men* are on work on tracks, markers must be placed and no cars moved beyond the safety zone.

18. *All motive power* must be kept in good working order and safe. General steam boiler rules apply.

RULES FOR COAL DEPARTMENT

1. *There is danger in passing under* coal handling machinery from coal or from broken parts of machinery falling.

2. *When working with a crane, get into a place of safety. Do not stand within working range of bucket. Do not stand under bucket when machine is not working.*
3. *Before moving a car, unloader, or stock bridge, be sure that no one is in a position to be injured.*
4. *Attention is called to the danger of coming in contact with electric power wires or rails supplying power to unloaders and stocking bridges.*
5. *See that gears and shafting are properly protected at all times, and that handrails are in place and safe, and report dangerous places to your foreman at once.*
6. *Never attempt to clean the coal off the inside of a conveyor belt when it is running.*
7. *Never throw coal, waste material or objects of any nature off the platforms and runways of any unloader, bridge or conveyor, without first making sure that no one is in a position to be injured.*
8. *In oiling or working around pulleys, shafting or other moving machinery, do not wear loose or ragged clothing. Do not oil or grease machinery while in motion.*
9. *Never enter a bin containing coal unless you have the assistance of another man, and a rope tied around your body. Be sure this assistant stands in a safe place and that he has his end of the rope so tied or controlled that it cannot get away from him.*
10. *Never throw material of any nature from the windows or roofs of any building without first making sure that no one is in a position to be injured.*
11. *Keep all runways, platforms, etc., free from loose coal, or other material which might be knocked off and injure others below.*
12. *Coal dust is explosive when mixed with air in certain proportions. Never use matches or open lights when dust is present.*
13. *Never ride on cars, locomotives or on other moving machinery unless it is your duty to do so.*
14. *Riding on conveyor belts is prohibited. Disregard of this rule will be sufficient cause for discharge.*
15. *Before crossing tracks: STOP, LOOK and LISTEN.*

RULES FOR COKE HANDLING DEPARTMENT

1. *Keep all stairways, platforms and runways free from loose coke. A stumble is sometimes fatal.*
2. *There is danger in passing under moving machinery from falling objects or parts of machines.*
3. *Never crawl under cars, and never go through between the cars of a train. Go around. Take no chances.*
4. *Do not open or shut any gas, steam or water valve, or electric switch, unless it is your duty to do so.*
5. *See that all shafting and gears are properly guarded at all times, and that all handrails are in place and safe. Report all dangerous conditions to your foreman at once.*
6. *Never throw objects of any nature from the trestles, platforms, or from windows or roofs of any building without first making sure that no one is in a position to be injured.*
7. *In oiling or working around moving machinery, do not wear loose or ragged clothing; be sure that your sleeves are tight at the wrist.*
8. *Never attempt to clean the inside of a belt while it is in motion; wait until it is shut down.*
9. *Never ride on moving cars or locomotives unless it is your duty to do so.*
10. *Before moving any car or starting any machines, be sure that no one is in a position to be injured.*
11. *Never ride on any conveyor belt.*
12. *Before crossing tracks: STOP, LOOK and LISTEN.*

RULES FOR AMMONIA CONCENTRATOR, LIGHT OIL AND BY-PRODUCT OPERATION

1. *Attention is called to the danger of coming in contact with electric power or light wires. Do not climb over, step on or pull on any wires.*
2. *Never throw objects of any nature from an apparatus, stairways, platforms, windows or roof, without first making sure no one is in a position to be injured.*
3. *When oiling or working around machinery or shafting, do not wear loose or ragged clothing, be sure that your sleeves are tight at the wrist.*

4. *Do not open or close* any valves, or any electric switches, unless it is your duty to do so, or unless you have been instructed to do so by the foreman in charge.

5. *Never use an open light* or lantern to inspect the inside of an apparatus, tank or pipes used in these departments. If inspection with a light is necessary use a flashlight.

6. *Gas is dangerous.* Dangerous gas may be found anywhere. Sometimes you cannot see or smell it. It may make you unconscious before you know gas is present. Sometimes gas makes you feel dizzy, or gives you a headache, or stiff neck, a choking sensation, or weak legs. When you feel any of these symptoms, get into fresh air at once. Go toward and out the side of the building toward which the wind is blowing if this is possible. When ammonia gas is escaping, the purest air is next to the floor.

7. *Do not allow tools, bolts, nuts or loose material* of any nature to lie on any platforms, stairways, floor or apparatus; it may fall or be knocked off and injure someone below.

8. *Always assure yourself* that all stairways are safe and free from obstructions, and that all handrails are in place and safe. Report all dangerous places or conditions at once.

9. *Be sure that all safety valves* on the apparatus you operate are in working condition and that they will blow at the pressure for which they are set. Do not attempt to change or renew thermometers, pressure gauges, etc., without advice from your foreman.

10. *When opening or closing cocks* on apparatus subject to corrosion, stand so that you will not be injured by escaping liquid or vapor if the nipple breaks.

11. *Use no open lights* and strike no matches in any building where gas, oil or tar are handled or used. No matches should be carried.

12. *Be sure that all cellars, sumps and pits* are well ventilated. Use caution in entering same unless you know that no gas is present.

13. *Ammonia gas* in small quantities is harmless; in large quantities it is dangerous to breathe. Avoid breathing if it is strong enough to make you cough. Hold your breath and get into fresh air as quickly as possible. Go toward and out the side of the building toward which the wind is blowing if this is possible. When ammonia gas is escaping the purest air is next to the floor.

14. *Be sure that all safety wiring and safety globes and lamps* in any of these departments are maintained in good condition. If you find a broken globe or defective wiring notify your foreman at once.

15. *Every man working* with acid or other corrosive liquors should know the use and location of the proper antidotes. If you have not this information ask your foreman for instructions.

16. *Before crossing tracks: STOP, LOOK and LISTEN.*

17. *Do not wear loose or ragged clothing* around moving machinery. When working on same be sure your sleeves are tight at the wrist.

18. *Buildings must be ventilated* well at all times and particularly when machine is down for repairs.

19. *When repairs are being done* men should work in pairs.

20. *Constant supervision for leaks is necessary.*

21. *Condenser tubes* in the Ammonia Concentrator machine develop leaks due to action of materials handled; when this happens it becomes necessary to remove the old tube or tubes and put in new ones. Before attempting to do this be sure pressure is off machine. Proceed as follows: Shut feed liquid off. Shut off steam and wait until pressure gauge on direct steam rings show no pressure. Machine and building should be thoroughly ventilated and men work in pairs in short periods. Wear close fitting goggles, if possible. Strong ammonia gas causes painful injuries to the eyes and all precautions should be taken to avoid it. Take your rest periods in the fresh air outside the building. All shut downs for repair or cleaning to apparatus or piping are important and apply as above.

22. *In the event of any strong liquid line breaking,* use gas mask to close valves.

23. *Serious burns* have occurred from opening doors of lime reservoir before reservoir is properly drained. This liquid temperature is about 90 degrees centigrade and must be drained before attempting to open door. Drain cock is located at bottom.

24. *Always shut triplex pumps* down before closing discharge valve to prevent injury to yourself by gaskets or packing blowing and damage to pumps or piping.

25. *Personal cleanliness* is important. Provide extra clothes so that complete change may be made. Benzol tar, etc., may cause skin irritations, and possibly more serious trouble.

RULES FOR BLUE GAS

1. *Blast lines* are provided with explosion heads, and should be inspected regularly.
2. *All equipment* must be watched carefully and kept in first class working order.
3. *Caution* should be used when charging hole cover is removed for charging of fuel and, when released, stand away and open by using hook which is provided.
4. *Keep house well ventilated.*
5. *Housecleaning* conditions are important. Keep everything in its proper place.
6. *Before wetting ashes*, move car to safe distance to avoid burning men on floor above.
7. *Clean the handhole* openings at the bottom of the hot valves daily or as often as necessary.
8. *Clean the bottom* of the up and down connection weekly or oftener if necessary.
9. *Keep all valves* and cocks tight and in good working order.
10. *Never put an open light* of any kind in the generator until the set has been opened and thoroughly ventilated.
11. *Never allow flame* or fire inside or near any uncovered openings in the washbox, scrubber or condenser.
12. *If the set* has been shut down for a short time and its operation is to be continued, turn on a little base steam to purge the gases out of the ash pit before putting on the generator blast.
13. *When cleaning wash boxes* care should be taken to see that they are thoroughly purged of gas and valves closed tight and fastened.
14. *Never open* the charging door or any other door which may cause a flash while men are clinkering or working at any opening of the set.

RULES FOR POWER HOUSE AND GAS PUMPING

1. *All switchboards* must be provided with rubber mats, and when switches are operated men must wear rubber gloves.
2. *All power* producing units must be regularly oiled and kept clean.
3. *All machine frames* should be grounded.
4. *Gas pressure* on high line should not be carried over 40 lbs. as this is the maximum working of compressors.
5. *Gas holder* should not be carried lower than half a lift from the bottom. Before it reaches this point notify oven foreman.

RULES FOR PURIFYING HOUSE

1. *Gas leaks* are dangerous and should be attended to promptly.
2. *Exposure of matches* or any inflammable material is not tolerated.
3. *When repair work* is to be done no man should work alone.
4. *Boxes should be cleaned* as frequently as necessary and when this is done care should be taken to see that box and house is thoroughly ventilated and men watched and relieved to avoid being overcome by gas. Inlet and outlet valves should be securely closed and fastened.
5. *When changing flow of gas* in boxes gas flow should not be interrupted. The new flow valves should be opened first.
6. *In the event of escaping gas* from a leak or from any cause, house should not be entered until thoroughly aired.
7. *Seals must be inspected* regularly and kept in good working order and whenever possible should be located outside the building.

RULES FOR BOILER PLANT

1. *All boilers* must be inspected and cleaned regularly, all scale and soot removed, safety valves repaired and tested, water columns cleaned, tri cocks cleaned, steam gauges tested, blow off valves inspected, and overhauled if needed. In general all boilers should be kept in first class working order.
2. *No one is allowed* to enter boiler without first notifying fireman and making sure blowoff valve is securely closed and fastened.
3. *Housecleaning* conditions are important.

RULES FOR MAINTENANCE DEPARTMENT

1. *Be sure you know the rules for safety in all departments in which you work.*
2. *When chipping see that your tools are not battered, and provide yourselves with eye shields, thereby preventing chips from injuring your eyes.*
3. *Never work under a car, locomotive, pusher, or similar machines, without first notifying the operator and placing the proper danger sign.*
4. *Obtain from your foreman, danger signs to be signed with your own name. Never neglect to place these so that you will be protected when movement of machinery on which you are working will be dangerous to you.*
5. *While at work do not lay tools or other objects where they may fall and injure others.*
6. *When you complete a job, never leave tools or loose material lying overhead. Tear down all temporary scaffolds as soon as you are through with them. See that all dirt and refuse is cleaned up before you leave.*
7. *When leaving a partially completed job, be sure that there are no openings left through which others might fall. Be sure that all handrails, guards, and other safety appliances are replaced or in a safe condition until you return. Leave no material or apparatus in such a position that a slight disturbance might cause it to fall.*
8. *Always replace all safety guards on the completion of repair work which has disturbed them.*
9. *Do not pile any material so high or in any way so that it is likely to fall.*
10. *Never place heavy weights on platforms or floors unless you are sure of their strength. When in doubt ask advice of your foreman. Take no chances.*
11. *Do not wear loose or ragged clothing around moving machinery. When working on same, be sure your sleeves are tight at the wrist.*
12. *Never open or close a gas, steam, liquid, water valve or electric switch without notifying the operator in charge and the foreman of the department in which you are doing the work.*
13. *Inspect regularly all tools and appliances with which you work. Worn or damaged tools may slip or break and cause injury to yourself or others.*
14. *Never go into a boiler until you have closed all valves and attached a danger "Do Not Move" Sign to each.*
15. *Never enter a boiler or tank unless there is a man outside to watch for your safety.*
16. *Before crossing track: STOP, LOOK and LISTEN.*
17. *When working on pusher, charging car, quench car, and motor car see that power is off so that car cannot be moved.*

RULES FOR ELECTRIC DEPARTMENT

1. *Every workman not duly authorized by the chief electrician, is forbidden to work on or tamper with any electrical wire or machinery.*
2. *It is possible to receive a fatal shock from 125 volt circuit under certain conditions.*
3. *Linemen are warned against the danger of working on live circuits. Do not do so without the advice of your foreman in each case.*
4. *When the power is cut off of a line for you to work on it, always place a sign bearing your name on the switch where the power is turned on, stating that men are working on the line.*
5. *When the work is completed, remove the sign. No one except the man who placed it should ever remove such a sign.*
6. *Never close a switch without full knowledge of why the switch was opened.*
7. *Linemen should always wear safety belts when working overhead.*
8. *Inspect regularly and frequently all tools and appliances with which you work. Worn or damaged tools may slip or break and cause injury to yourself or others.*
9. *The electrical department is responsible for the maintenance of all safety globes on lamps, and safety wiring throughout the works. Inspectors must inspect regularly and report all defects found to their foreman and to the foreman of the Department where the defects are found.*
10. *Before crossing tracks: STOP, LOOK and LISTEN.*
11. *Do not wear loose or ragged clothing around moving machinery. When working on same be sure your sleeves are tight at the wrist.*
12. *All machinery to be kept in constant repair and clean up after each job.*

RULES FOR RIGGERS

1. *Take no chances, for yourself.* It is crime to take chances affecting the safety of others.
2. *Inspect regularly* all tools and appliances with which you work.
3. *If you have left rigging standing* over night or during the noon hour, inspect carefully all ropes, guy lines and hoisting machinery before starting work.
4. *When in doubt choose the safe course.*
5. *Never ride* on a moving load or on material being hoisted.
6. *Crane and hoist operators* are forbidden to hoist any loads carrying a man.
7. *Stay from under* all material being hoisted.
8. *When moving heavy objects,* place hands, feet and bodies so that you will not be hurt if they fall, slip, or roll.
9. *All chains* used for hoisting should be annealed at least once in six months.
10. *When working above other men,* let those below know about it. When working below other men, let those above know about it.
11. *Never fasten* guy lines to or snub lines around any pipe without the advice of your foreman.
12. *Do not wear loose or ragged clothing* around moving machinery. When working on same be sure that your sleeves are tight at the wrist.
13. *Before crossing tracks: STOP, LOOK and LISTEN.*

DISCUSSION

Mr. D. S. McEachern (Fire and Safety Engineer, Coke Manufacturing Dept., Semet-Solvay Company, Detroit): I am going to touch on three or four points that were brought up here this morning, and the most important one I think is that of the foreman being the "real boy." The foreman, I say, is the biggest factor in the elimination or the prevention of accidents. If we find that a foreman has a large number of accidents and the investigation discloses that he failed to properly instruct his men, we discharge him, and we pick out of this same gang to take his place a man that has shown some interest in safety work. Of course, it is important that this man should understand the operation of this department; we take that into consideration.

We find it is far better to discharge a foreman under those conditions than to give him ten days off. That fellow comes back with a rock in his heart, and he is a knocker for the movement from then on. He is sore against safety, so the cheapest and easiest way to handle it is to discharge him.

Bad housekeeping and waste play an important part in accidents in by-product plants. When I say waste, I mean material that is carried out on a job and left, old parts and new parts, bolts left on runways, on steps and stairways and on platforms.

Mr. M. B. Hile (Citizens Gas Company, Indianapolis, Ind.): I represent the Citizens Gas Company. Since this program was made up Mr. Forrest has severed his connection with the company as general manager.

I believe much in disciplining the foremen, and I do not believe that it makes soreheads. In fact, not only do we fine a foreman or an employee responsible for an accident, but we put him on the safety committee. I believe a lot of them can be whipped into line in that way. If a fellow is a little bit cool along safety lines, we give him a safety job.

The big problem in our plant happens to be with the so-called leisure class, the negroes, and we have a great deal of trouble at times in keeping these fellows from nursing a supposed injury.

Mr. F. D. Warren (Blackstone Gas & Electric Co.): I usually give them a hint that there is a list in town, and malingerers are usually put down on it, and it is pretty hard to get a new position after they have done a lot of soldiering.

Mr. R. Buckminster (Pawtucket Gas Co.): The rules outlined by Mr. O'Malley's paper are applicable principally to coke oven plants, and there are comparatively few of them as compared with the water gas, verticals and horizontal plants throughout the country. My impression is that the gas company representation, both in the Safety Congress and in this section is comparatively small when we leave out the combination companies, and I would suggest that the proper department see if they couldn't get more gas company members, and then have a joint committee that would report on a paper like the first presentation, that would take in the distribution department and the plant. I am sure that the information we could get from such a committee would be of wonderful value to the gas companies in general throughout the country.

EMPLOYEES SHOULD BE MADE TO FEEL RESPONSIBILITY

Mr. Harper (Kansas Gas & Electric Co.): The gentleman from Boston raised a thought that has been bothering me a good bit for the last year. I think as our safety and welfare work goes on, we are too apt to do too much petting. We don't leave the men with a feeling of responsibility that every man ought to have. We ought to cultivate that, too, as well as so much of this paternalism.

Chairman Mitchell: The matter of discipline, gentlemen, is a matter of districts. I have worked in quite a scattered part of the country at different times in the last thirteen or fourteen years, and I find that what you can do in one situation, you can not do in another. You can discipline men in a certain district, and you can't work the same discipline in another; it is absolutely impossible.

Mr. A. D. Quesnel (Commonwealth Steel Co.): We are not a public utility corporation. At our plant, we go on the assumption that accidents occur because they are caused and do not happen. We claim that all accidents are preventable. We do not admit that there are unavoidable accidents. There is only one class that might be termed an unavoidable accident, and that is an intentional accident. An intentional accident must be planned, and an accident of that kind is a calamity and it is not an accident at all.

THURSDAY MORNING SESSION

Chairman Mitchell: We will then proceed with the addresses, the first one being "The Hazards of Improper Radio Installation," Mr. H. J. Burton, of the Consumers Power Co., of Jackson, Mich.

THE HAZARDS OF IMPROPER RADIO INSTALLATION

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Notwithstanding the fact that it is nearly thirty years since Marconi first experimented with wireless and more than seventy years since the theory of wireless has been known, previous to 1921 the public knew little about the subject. Broadcasting has revolutionized radio communication and today "listening-in" is one of the most popular pastimes in the country.

In new developments and pioneer work, in almost every field of activity, mistakes and accidents occur. It is difficult, if not impossible, to guard against accidents in advance of the inventions or devices which make such accidents possible. Serious accidents have occurred in the installation and operation of radio sets. With the rapid development of radio thousands upon thousands of receiving sets have been installed, aërials have sprung up all over the country and broadcasting stations have virtually woven "webs of radio" over the entire world.

Investigations show that although adults have been seriously injured, and in some cases killed, the majority of radio accidents have occurred to children. Radio is a life saving, not a death dealing agency. Thousands of lives have been saved when messages have come across the seas giving the location of vessels in distress. It is one of the safest and sanest of pastimes if the apparatus used is properly installed and handled. The purpose of this paper is to outline some of the many accidents which have occurred due to improper installation and handling of radio equipment. Certain lessons have been learned in the "dear school of experience," and measures are now being taken to avoid repetitions of the accidents.

The fatal and most serious radio accidents appear to be due to electric shocks and burns—although it is no doubt true that most electric shock victims could have been revived or resuscitated if it were not for other injuries due to falls or caused by burns. It should be kept in mind that most of the accidents reported in connection with radio have been due to the installation and handling of equipment by children and inexperienced amateurs. Often too much haste in attempting to get the apparatus installed has been the fault.

The amateur electrician or more experienced radio fan has come in for his share of accidents. More difficult and really hazardous work has been attempted by amateurs of this class. Most radio enthusiasts have attempted to receive messages only, but some of them who have more or less knowledge of electricity have built sending stations of their own. While every encouragement should be given to young men to study and experiment, they should be warned of the dangers and given proper instruction, so they will be in position to avoid the pitfalls of those who have been injured.

The amateur sending station is generally erected and operated by young men possessing some knowledge of electricity. These men have often received shocks and have some idea of the effect of a flow of electrical

current through the body. But it is a fact that "a little knowledge is a dangerous thing," and a smattering of technical terms and a knowledge of a few of the fundamentals will not make a young man competent to handle transformers that "step-up" to high voltage, nor will it make him competent to climb poles, stand on roofs and handle live wires. A number of accidents, some of them serious, may be traced to the careless handling of equipment that in the electric light and power industry would be considered extremely dangerous and handled only by experienced men under careful supervision, and with every precaution in the way of tools and appliances for the prevention of accidents.

HAZARDS OF TRANSMISSION EQUIPMENT

Most transmitting or sending equipment is very dangerous if improperly used. Many radio enthusiasts do not realize the caution necessary in handling the "step-up" transformers used with such equipment, especially if the high voltage terminals are not plainly marked and properly guarded. Many amateurs have purchased distribution line transformers for spark transmitters. This type of transformer is not a plaything and should be used only under proper supervision.

The placing of radio aërials and equipment too close to energized electric light and power wires is obviously a hazard, not only to the one who places the wires but also to the one who uses the equipment connected to the wires. A radio aerial not provided with an approved lightning arrester and suitable ground wire permanently connected to a good earth connection is a lightning hazard, and as such is dangerous to life and property. This fact has often been overlooked with disastrous results.

Storage batteries not carefully installed and adequately protected by fuses are a fire hazard and operators have been severely burned when short circuits have occurred on some of the larger capacity batteries now used. Proper ventilation should be provided when batteries are being charged and open exposed flames should be kept away.

All wiring should be approved by some competent authority. This is especially true when connections are made to the ordinary electric light service. The installation of a rectifier and battery may overload a circuit and special wiring be required, a fact often overlooked by the radio enthusiast.

The up-to-date receiving sets now being manufactured by reliable companies in large quantities are simple to handle, in fact the majority of sets are owned and successfully operated by children and amateurs. The ability to operate a set successfully does not necessarily mean ability to install such a set. Proper installation means the erection of an aerial, wiring, and the making of electrical connections. Work of this kind should be undertaken or supervised only by competent electricians and linemen properly trained and equipped for the work. There is no wonder that accidents have occurred when boys and inexperienced laymen have climbed poles and performed other feats usually undertaken only

by specially trained men equipped with safety appliances. It is significant to note that it has been necessary for the electric light and power companies to kill circuits in order to remove aërials installed by amateurs.

The following partial list of accidents which have been reported proves the existence of a serious hazard.

HOW FATALITIES HAVE OCCURRED

"A boy of sixteen assisting a friend to erect an aerial had wires attached to a slender pole and when the pole dropped into the hole it fell toward an alley, the wires coming in contact with an electric light and power line. The boy holding one of the wires was instantly killed. The wires wrapped around him and burned the body badly."

"A man was placing an aerial from tree in lot across alley to gable of his own house. He was pulling the bare aerial wire over the insulated 4600 volt wires in the alley when the insulation wore through, it grounded through his body and he was instantly killed."

"A young man was killed by a charged aerial when he attempted to clear wreckage caused by wind which blew down the aerial. The wires had been supported above the electric light and power lines on a tall mast."

"Two boys were attempting to string an aerial from house to house over electric light and power wires. One boy was killed and his father who attempted to rescue him was also killed."

"A man was killed when he attempted to rescue a boy who had run into an aerial lying over a 220 volt service wire which was on the ground. It had been raining and was very damp and foggy. The boy was unable to get away from the wire and several persons attempted to rescue him. All received severe shocks. The first man to make the attempt was killed. One man finally cleared the wire. The boy recovered although he was badly burned."

"A man was killed when his head came in contact with a broken signal wire which had fallen over a street lighting circuit. This wire had been put up between two houses on opposite sides of the street by two boys to operate a telegraph instrument. The wire was broken by a windstorm and when the lighting circuit was turned on in the evening, the wire set fire to some grass and the passerby was killed investigating it."

"A man shifting wireless apparatus on the roof of his house came in contact with high voltage lines and was instantly killed."

"A boy, aged 17, a radio experimenter, was electrocuted, when working on his apparatus. He was connecting up a storage battery with a lighting shed at the rear of his home when the accident occurred."

"Two boys were instantly killed while attempting to install an aerial which they had thrown over an electric light and power line."

A number of serious, and some fatal, accidents have occurred in different parts of the country when wires attached to kites have come in contact with energized lines.

Amateurs who have installed poles for aërials have neglected to guy them sufficiently and received falls with serious results when the pole has

fallen under their weight. In erecting antennae quite often a tall slender pole is used, being guyed in 3 directions. The antennae wire is held to the pole by a rope run through pulley. In a short time this rope rots and breaks and the antennae fall. In some cases the ambitious amateur attempts to climb the pole, which is often made of 4 x 4 timber, spliced to a length of 40 or 60 feet. In still other cases the pole consists of lengths of pipe. Accidents have resulted from this through losing grip on the pole, as well as by the pole itself breaking causing a disastrous fall.

Several instances have been recorded where wires attached to chimneys have started bricks falling endangering the lives of those below.

STORAGE BATTERIES

The following notes contributed by a radio enthusiast serve to emphasize what has been written about storage batteries: "When the battery is charged by the owner of a radio set it is quite often installed in a living room, adjacent to receiving set. When battery gases, if the caps are removed, small bubbles rise to surface and break, throwing a spray of electrolyte out of battery. To avoid this some operators leave the plugs in place, allowing the vent to take care of gassing. In this case, if an open flame is brought in the neighborhood of the battery, the confined gases explode, blowing the caps out of the battery and scattering electrolyte. Battery should be installed in basement and properly fused leads run up to the receiving set."

Although no actual figures are available it is safe to say that radio accidents seem to be on the decrease. It is impossible to estimate how many accidents have been averted by proper publicity and by the prompt and decided action of many public utilities which, as soon as conditions were realized by them, made a survey of their properties with a view to eliminating the hazards of aeriels in close proximity to live lines, and who broadcasted information and warnings to the public. The warnings were in the form of stickers attached to customer's bills, newspaper advertisements, talks before school children, and, in some instances, warnings and information were sent out by means of radio itself.

The National Electric Light Association deserves credit for the prompt action in appointing committees to study the radio hazards in connection with their own lines. This prompt action has no doubt saved many lives. The following suggestions and pertinent points have been compiled from information sent out by member companies of this association. The warnings are addressed to children and the public generally:

"Never pick up a wire lying on the ground or dangling from a pole. The wire might be 'live,' that is, charged with electricity to a dangerous degree. Report fallen wires immediately to the police department or Power Company.

"Never climb a pole to which wires are attached. They might be in contact with high voltage wires and consequently dangerous.

"Never string wireless aerials over or under any other wires. Should these two sets of wires come in contact with one another the aerials might become dangerously charged.

"Never attach radio aerials or anything else to poles carrying wires of any sort. Accidental contacts with live wires may cause injury or death, or bring about fires.

"Always attach aerials to substantial supports, so located that if either the support or aerial wire breaks it cannot come in contact with other wires.

"Remember that it is quite practical to operate a radio set with an indoor aerial.

"Do not use kite aerials.

"Do not attach aerials to any pole or tower carrying wires.

"Do not string radio antennae over or under any other wires.

"Do not attach antennae to anything but substantial supports.

"Do not climb poles upon which wires are supported.

"Do not attach antennae to chimneys. Chimneys were not designed for such purposes, and you might be down below when the bricks start falling.

"In the interest of public safety the Company is forced to forbid the attaching of any radio aerials to its poles and to insist that no radio antennae be strung above its power distribution wires."

Many amateurs who plan the erection of a high aerial fail to realize the flimsiness of iron pipe in long lengths. An iron pipe pole is very limber and bends very easily during erecting. At the same time it is very heavy. Such a pole should be erected by men experienced in this class of work.

Some radio men are putting a fuse in the aerial circuit, so that if it picks up any current it will blow the fuse. A small instrument fuse gives sufficient capacity for this purpose.

INDOOR AERIALS ARE SAFEST

As the art of radio has developed, it is seen that one very effective remedy for the hazards incident to the use of the outdoor aerial is not to use it. Antennae wires may be erected indoors, and when equipped with proper instruments will give very good results, though as yet they do not seem to be quite as satisfactory as the outdoor type.

Indoor antennae are not subject to crosses with power and light wires or other commercial conductors. There is no special danger of the aerial or the erector falling during erection. Windstorms or sleet will not affect the indoor wires. Interference will be reduced to a minimum.

The indoor antennae should be supported on as good insulators as the outdoor type, and should be provided with the same lightning protection and ground switch equipment and handled in much the same manner. As the development of radio progresses the remaining obstacles to the satisfactory use of the indoor aerial will be overcome and the cumbersome and often dangerous outdoor aerial will be a thing of the past.

In summing up the following general recommendations are made:

Amateurs should not be allowed to attach aerials to poles or towers carrying electric light or power wires.

Indoor aerials should be installed where practicable.

All radio wiring should be done in a workmanlike manner and approved by a competent authority. Storage batteries and rectifier sets should be properly located. The ordinary living room, or any location easily accessible to small children, is no place for a storage battery with its acid, fumes, and possible fire hazard.

High voltage wires are dangerous to touch or approach even if they appear to be well insulated and children should not be allowed to play with them.

DISCUSSION

Mr. Opp: First of all, the remedy, aside from those already suggested, would be the propagation of publicity as to the hazards involved, because undoubtedly most of the accidents that have occurred in connection with radio, aside from being chargeable to carelessness, or that ever-present lack of attention on the part of the person doing the work, is the fact that there is lack of knowledge of the hazards involved. The people injured have in many cases not realized the force with which they were playing, and as a consequence, publicity must be directed upon that very point.

That can be done through the newspapers, by paid advertising, but better by editorial comment or printed interviews. Your own state bureaus of public utility information are mighty good agencies through which very forceful caution can be broadcasted to the public.

Another source or manner of propagating the information regarding the hazard is by the flyers upon the bills going out to the customers; and in a locality that has a very high percentage of saturation of electric light customers, you make many, many contacts. Then, in addition to that, after a short interval, there is the proposition of imprints upon the bills. The flyers may be torn off, but the imprints stay there. There is a way of getting the message into every home.

Another field of propagation is that of the school and the clubs being addressed upon the proposition of the hazards. That enlarges the admonition considerably.

A real remedy, of course, lies in the proposition of codifying, as has been done in the National Electric Code, the 1923 edition, a set of rules that should be complied with in connection with the erection of radios or installation of the outfit. That is something that will act as a guide for municipal or local authorities, giving them the information that they need toward proper inspection.

Another means of getting some action is through the enactment of local ordinances compelling inspection, licensing, and, in some cases, the permit for the installation of the outfit.

Mr. H. W. Lueck (assistant superintendent, safety division, Commonwealth Edison Company, Chicago): The small transformers which are now obsolete in our company, many times are defective. The children find that by rewinding the cores they can make dandy rectifiers out of them. They don't know the high side and the low side of these transformers, and the result is that when they test them out they are injured. Many times they get hold of the wrong side.

Some of the accidents we have had have resulted from boys stringing wires through the trees, and when the tree is wet, it has sent high voltage into the house.

THE AMATEUR AND THE BROADCAST LISTENER

Mr. C. F. Horle (Federal Telephone and Telegraph Company, Buffalo): The amateur is the person we were discussing this morning mainly. He makes up a heterogeneous collection of apparatus and puts it together, and uses that for communication with his friends. If he finds that his antenna, which is only 20 feet from the ground, is improved by raising it, he soon manages, by some scheme, to raise it to 60, and, that almost insane desire to increase the effective range of his apparatus, undoubtedly does result in some of these unfortunate situations which Mr. Burton has so well enumerated.

There is another type of individual who very fortunately is far outnumbering the amateur. We, in the radio end of the game, speak of him as the broadcast listener. He has no interest, not the slightest interest, in any communication.

You must definitely bear in mind that those two types of individuals rarely or ever reside in the same body. They are invariably two different individuals. In the first class usually falls the younger chap, the boy who has "fallen" for the lure of radio, the rather irresponsible fellow. Naturally, he is the kind of fellow who is going to get into trouble.

The other class is composed predominantly by men and women beyond 21 years of age. I suppose if we were to make a canvass of the country, we would find that as for years, there are probably more radio broadcast listeners between 28 and 35 years of age than any other age. That group of individuals are mature. They haven't got this almost erratic enthusiasm of the amateur, and they therefore don't subject themselves to the dangers which go with amateur operation.

The point I wanted to make was this: those maturer individuals, in the first place, haven't the enthusiasm for the construction of apparatus that the amateur has. They want entertainment, and they get it the easiest and quickest way they can do it, and since perhaps the most difficult job in the installation of the radio set is the antenna, they invariably put up some sort of a small antenna.

Both types of interference, static and mutual interference between stations, are reduced by the use of a small, low, outdoor antenna or by the ordinary indoor antenna, and that has become so generally appreciated, and the appreciation is becoming more general every day, that I venture to say that within two years, you gentlemen, except for the amateur type

of installation, aren't going to know of outdoor antenna. The broadcasting station isn't going to use them. Those two inherent advantages, this matter of freedom from interference between stations and freedom from natural disturbances, is forcing the broadcast listener to the indoor antenna, and it is further fostered by the fact that we are getting more and more broadcasting stations every day and the problem of interference is growing every day, and we naturally have to get away from good, big, efficient, outdoor antennae.

There is another influence which I might mention which is forcing the antenna structure away from the dangerous proximity to power wires. When one uses rather insensitive apparatus, one can have an antenna fairly closely located to a power line, but when your apparatus is so designed to allow of reception over tremendous distances, high sensitivity (and that is the common kind of broadcast apparatus today) the presence of power wires invariably seriously hampers or completely spoils the reception of radio signals by the voltages induced from the power wires, and that influence is slowly but surely forcing the broadcast antenna away from the power line. It is eliminating that hazard without a question.

STORAGE BATTERY HAZARD IS BEING REDUCED

I am not willing to commit myself to the statement that we are getting to a time when the storage battery will be eliminated, but that hazard is being reduced very fortunately. Where there is a storage battery used, it is certainly the thing to do to require that the leads from that storage battery be fused to prevent excessive current flow in the case of short circuit.

As for the matter of charges, that has become rather important in the last year. In my own experience, all of the battery chargers that I have occasion to come in contact with, the current which they draw from the line I believe is not in excess of that ordinarily handled by the average size electric iron, and they are all equipped to my knowledge with a well-protected cord and a plug for a screw socket. They are therefore quite easily handled, as easily as an ordinary electric iron, and to my mind require no more special protection or special caution than does the ordinary electric iron.

Mr. MacLachlan: I would like to point out that on one type of rectifier at least, there is a non-protected high tension terminal on the top which resulted in one of the fatalities Mr. Burton pointed out in Ontario. At the present time, they are prohibited from sale in Ontario. If the manufacturers are going to turn out this apparatus, let them protect the high tension terminals if they are going into the hands of the average layman.

REPORT OF NOMINATING COMMITTEE

Chairman Mitchell: Before proceeding with the next paper, gentlemen, we will have the report of the nominating committee.

Mr. Darlington: Your committee respectfully submits for chairman, Herbert Moses, of Boston; for vice-chairman, B. B. McCulloch, of Chicago, and for secretary, George Opp, Detroit. (The secretary was directed, by vote, to cast a unanimous ballot

**THE PREVENTION OF PERSONAL INJURIES DURING
THE CONSTRUCTION OF GAS, ELECTRIC
AND OTHER PLANTS**

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In speaking of "The prevention of Personal Injuries," we are speaking of the result which we wish to produce. Injuries are prevented by the control or removal of hazards and it is with hazards that we have to deal. A hazard is anything which has possibilities of an accident connected with it in any way. An accident is an occurrence which is due neither to design nor negligence; negligence being culpable carelessness.

There are many classes of hazards, among which are:

Relating to Persons,

Mental

Fatigue
Carelessness
Horse-play
Confusion
Intellectual Status

Physical

Defective Vision
Heart Trouble
Hernia

Relating to Things,

Semi-controllable

Floods which may be controlled by dykes
Lightning which may be controlled by lightning rods
Stairways, Ladders which may be controlled by hand rails and cages

Controllable.

Moving parts which may be encased
Ditches which may be guarded
Windows which may be barred

Removable

Loose Boards
Protruding Nails
Projections on walks

Accidents resulting from these hazards are of two fundamental kinds. One is an occurrence which results in an injury where no human mental process was directly contributory to the hazard. A person may be walking

along the street and get a cinder in the eye or be struck by lightning, or be hit by a broken trolley wire. A workman in a construction plant may step in a gully made by rain or slip on an icy walk.

Another class of accidents is the result of hazards to which the human mental process was contributory. In this class may be found by far the greater percentage of hazards. One authority states that sixty per cent of all accidents are directly the blame of the man hurt—ten per cent a fellow workman's fault—and only one-half per cent the employer's fault. A workman leaves a board with a nail sticking up and he or a fellow workman steps on it or he stacks bricks or steel so that the pile is insecure or walks too close to an excavation or drops a tool from an elevation.

HAZARD CONTROL

Hazards are removed or controlled in several ways.

By the careful supervision of employment and assignment of workmen: Any physical examination of prospective workmen tends to reduce hazards. The proper assignment of workmen to jobs based on observations of their mentality, temperament and experience also tends to reduce hazard.

By the observation of the mental and physical condition of employees: Workmen become careless through worry, become over fatigued, are handicapped by improper clothing or weakened through illness. All of these conditions tend to increase the liability of accident and when controlled tend to reduce hazards.

By the employment of specialists: The duties of these specialists are to study accidents and hazards and to remove or control them. Many organizations have a staff headed by a "Safety Engineer." It is his duty to see that stairs have hand rails, that projections on sidewalks are removed, that fire apparatus is always in order, etc.

By the education of employees in Safety: Many workmen are injured because they do not perceive or conceive a hazard. They would have no means of recognizing many hazards, unless taught by experience or by Safety education. This is not necessarily a reflection upon the workmen's mentality. One not versed in Safety matters would probably not realize that stairs are hazards. In one of the largest department stores of the country, there are nearly one hundred accidents on their stairs to one in their elevators.

EDUCATION IN ACCIDENT PREVENTION

So many accidents happen because of some hazard to which the injured workman or a fellow workman is directly contributory, that it is evident that the education of workmen along safety lines should receive considerable attention.

At the time of employment, the engineer should give each employee fundamental instructions and caution as regards Safety, and this should be followed at various times by specific instructions as to the precaution to be observed in the particular trade, or capacity in which each work-

man is employed. The engineer can do much to create the proper attitude towards Safety by presenting it as a serious and ever present question.

The greatest difficulty in presenting the subject of safety or hazard control is to present it so as to avoid being obvious or monotonous. As an illustration, the signs reading "Avoid Fires—No Smoking," have no particular force or educational value. A sign reading, "If this building burns, you will be out of a job," has a "kick" in it and a real educational value. Pictures and drawings are by far the best method of presenting the subject, but they may be too obvious or too posed. Many persons resent having the obvious called to their attention even though it be for their own good.

Within many organizations, it will be found that there are many who shows no particular interest or enthusiasm toward safety matters. The education along safety lines should not be confined to workmen but all employees should receive a certain amount of training. Foremen, erecting engineers, inspectors, designers and all others who have to do directly with construction should receive the same training as the workmen and in addition such as fits their particular sphere of activity.

Although the presentation of safety matters to workmen is for the purpose of education, the method of presentation should be along practically the same lines as advertising. The psychology of safety presentation is the psychology of advertising. To the safety engineer or the employer, safety matters appear so serious that it is hard to believe that employees may be indifferent. For this reason, Safety is not always brought to the attention of the employees in such a manner that there is created a desire to follow the suggestions made.

This is parallel to the case of some one who has an article to sell which he knows to be the best that can be made. If his advertisement reads "My article is the best. You should buy" no one is particularly induced to buy. If his advertisement is illustrated or has a text to show that his article is the best so that the prospective customer is able to form that conclusion of himself or if the add creates a desire to buy, then the article will probably be sold.

Safety matters must be so presented that there is created a desire to follow the suggestions made. They must be so presented and repeated that they are retained in the memory of the employee without any particular effort on his part.

SUMMARY OF PRECAUTIONS TO BE OBSERVED

Design. The prevention of injuries in construction starts with the design. Many hazards may be controlled or removed by proper design. This includes location of pipes above head height, the placing of valve stems away from passages, the construction of level floors, passages with ample space, and design of the machinery with sufficient working space around it.

Selection and Assignment of Personnel. One of the greatest hazards of construction work arises from the fact that practically a new organization is built for each job. For this reason more than ordinary care must be taken in the selection of workmen.

One of the greatest hazards with common labor is the lack of understanding of the English language. Whereas established organizations, such as large manufacturing concerns, can very well undertake the education of workmen, such a course is impossible on construction work. Workmen who cannot understand English should not be employed except as a last resort.

In interviewing applicants, the matter of physical condition should always be in mind. Men who are obviously physically unfit should not be employed under any circumstances. A little careful questioning will usually bring out conditions which may not be apparent at first. Men with poor eyesight are also particularly undesirable on construction jobs.

It is obvious that men should be assigned to jobs which fit in with their experience whenever possible. Dangerous hazards may be developed by assigning men to duties where they may be controlled by habits formed in other lines of work. For instance, workmen who have handled lumber for a long time are very liable to injure themselves in handling steel. Laborers who have been shoveling coke are very apt to strain themselves severely if assigned to shoveling sand. Many men cannot safely work above ground. To force a man who shows the slightest hesitancy to work at an elevation, is to introduce a serious hazard.

Supervision of Personnel. Many men habitually show a spirit of bravado toward hazards; these men should be weeded out of a construction organization unless they can be made to heed safety precautions. Men who prefer to slide down ropes rather than use ladders introduce a contagious spirit of recklessness. Men who continually turn to horse play or practical joking are dangerous. Men who habitually forget the ordinary precautions, as the use of goggles or the leaving of tools or material in dangerous positions, should be discharged if they cannot change their habits after being cautioned.

Survey of the Site. A good deal of care and thought should be given to the layout of the temporary buildings, yards, etc. which are to be used on construction work. The office should be so located as to give the most direct communication to the work and still not be in the way of hoists, steel yards, concrete mixers, etc. The store-room site must also be carefully selected. Too often the placing of the office and the storeroom in the same building increases the hazards in one or both without increasing the efficiency of the operation. Magazine for explosives should be as remote from the work and from inhabited buildings as possible. In nearly all localities there are restrictions as to the storing and handling of explosives which must be followed. Steel yards must be located with respect to the transportation to be used and with a view of handling the steel as little as possible. The precautions to be used in the construction of each of the above will be given later.

Clearing Site. Fire and injury hazards are greatly reduced if an effective clearing of the site is made before construction starts. Loose boards, glass, boulders, etc. should be collected. Rubbish, grass, weeds, etc. should be burned. On large construction jobs the customer should be requested to construct as much of any projected permanent fence as is practical and general precautions against the trespass of the public should be undertaken.

Excavations for Foundations, Pipe Lines, etc. The engineer should examine adjoining buildings before work commences to determine what props or other protection will be necessary. This material should be at hand when work starts.

The nature of the ground should be determined and the shoring which will be necessary for the excavation should be on hand before work starts. As caving usually comes without warning, no chance should be taken. All the shoring which the experience of the engineer shows to be necessary should be used. Earth which will stand up when dry will often cave when wet. All excavation should be examined carefully after every rain. Water should not be allowed to stand in any excavation; they should be guarded from drain water as they are dug. Excavations should not be left open after the pipe laying or foundations are complete but should be immediately filled. All excavations should be guarded by fences or railings when they are close to side walks, highways or passages. At night, all openings should be guarded by red lanterns and as many openings as possible protected by temporary fences or other guards, although they may not be so guarded in the day.

Blasting. The handling of explosives should always be done by experienced men. The Erecting Engineer should question all men who are to be employed where explosives are to be used as to their previous experience and should give the foreman and workmen general instructions as to the methods to be followed, the precautions to be followed and the tools to be used. See that goggles and bar tongs are used when drilling is done by sledging.

The handling of explosives should be under the direct supervision of a foreman blaster, known to be competent, self-reliant, trustworthy and conscientious, having good working knowledge of explosives. He should be physically fit and capable of performing any of the work under his direction. A man who boasts that he has handled dynamite for years and is not afraid of it, and handles it roughly to convince others that he has no fear of it, is a dangerous man to be engaged in this class of work.

Dynamite when stored for any length of time undergoes a mechanical change which increases the danger that attends its use. Therefore, when explosives can be readily obtained, not more than one day's supply nor less than one box, should be purchased at a time. Where explosives cannot be readily obtained, quantities up to 1,000 pounds may be kept on hand and stored in portable magazines. Where circumstances make it necessary to carry more than 1,000 pounds in stock, it must be stored in permanent magazines.

Isolation is of first importance when locating magazines.

The exterior of the magazine should be painted red and lettered in white as follows: **EXPLOSIVES. DANGER. KEEP FIRE AND LIGHTS AWAY.** Similar signs should be posted in the vicinity of the magazine.

Detonators are very sensitive to heat, friction and blows. They should not be dropped, nor struck against any hard body, nor left where they may be stepped upon.

Before being carried, detonators should be packed firmly with soft material, such as felt. Detonators should be stored in a separate portable magazine, at least 30 feet distant from the powder or dynamite magazine, and should not be brought near the dynamite magazine at any time.

Magazines should be kept clean and free from dirt, grit, cotton waste, candles, and matches. Tools or equipment should not be left in a magazine.

Only non-freezing explosives should be used.

Do not use metallic tools. Use only a wooden mallet and a hard wood wedge in opening cases. Cases should be opened at a distance from a magazine.

Cases of dynamite should be carefully stored on the flat side to lessen the possibility of nitro-glycerine running. They should never be dropped, stood on end, nor rolled, and care should be taken not to break the paper wrapping thereby exposing the dynamite to the air. When dynamite becomes moist its nitro-glycerine component tends to run and all the dangers follow.

Empty dynamite cases should not be allowed to accumulate, and should not be used again. When they are to be disposed of they should be piled, soaked in kerosene and fired by a paper "train."

Parts of cartridges should not be allowed to accumulate but should be used in making up the charges. Explosives left over upon completion of blasting operations should be returned to the original source of supply. Explosives should not be discarded by burying. Nitro-glycerine remains effective for years. Explosives should not be placed near wires, motors, trolley tracks or other electrically charged conductors.

Exposed flames should not be carried within 20 feet of a magazine. Dry battery type flash lamps are the only permissible lighting units for use in magazines.

Primers should not be inserted in cartridges until just before the cartridges are to be used. Where necessary to crimp a detonator a modern crimping machine should be used. Workmen should never use their teeth for this purpose.

To insure the safety of persons and surrounding property, only the minimum charge necessary should be used.

Nothing but wooden loading sticks should be used to tamp charges. Tamping should be done by direct pressure only. Tamping by strokes is dangerous and is positively forbidden. Clay or loam should be used as tamping material. All charges should be tamped up to the collars of the holes.

To intercept flying rocks and spalls, cover the rock to be blasted with a mattress of logs, which are at least 10 inches in diameter and 10 feet long, held securely together by chains or rope, and covered with a mat of several layers of burlap.

Red flags for use as danger signals should be provided, and men carrying danger signals should be stationed at safe distances on all sides of the blast to warn others. The shot should not be fired until all persons are out of the danger zone.

The handle of the battery or switch should be locked in non-firing position until charges are ready for firing. The operating of the firing apparatus should be confined to the foreman blaster or an experienced person especially designated by him for that duty.

The lead wires should not be connected to the battery or switch until immediately before firing the shot, and they should be disconnected immediately after the shot is fired. Bare conductors should never be used in shot-firing circuits, nor should an earth return be used in such circuits.

After the blast, no drilling or other work should be done nearby until the foreman blaster has made an inspection for unexploded charges.

In case a charge is not exploded the tamping must not be removed. A new bore-hole should be drilled at a safe distance from the unexploded charge. The location of this hole should depend upon the judgment of the foreman blaster, but in no instance should the new hole be closer than 12 inches from the unexploded charge.

Engineers should acquaint themselves with state laws and local regulations bearing on the use of explosives. Such information can usually be obtained at the source of purchase of the explosives.

See that goggles and bar tongs are used when drilling is done by sledging.

Steam Shovels and Similar Excavators. The greatest hazard which arises from excavating machinery on construction work comes from the proximity of workmen to swinging dippers or buckets. Shovel trimming should be done when the excavator is at rest or on the side away from that on which the machine is working. There is a great tendency to rush work during excavation and to have men within the excavation too early. The hazard is considerably reduced if the excavating work is allowed to proceed without rushing the construction of forms too close behind the machinery.

Erection of Concrete Forms. Since these forms are temporary structures, the tendency is to erect them with as little scaffolding as possible. As much attention should be paid to scaffolding in the erection of forms as in any other part of the construction.

Nails should not be allowed to be left protruding where they may injure persons even though the work is very temporary.

Placing of Reinforcing Rods. The placing of reinforcing rods requires skill, strength and care. The foreman selected for this work should be known as a careful person. Only intelligent workmen should be assigned to him. The material should be piled carefully and handled from

the storage yard in small quantities so that the working spaces may be kept as clear as possible. Because of the nature of this material it should be kept stored separate from other material. Small scratches and bruises which may lead to serious results, come from accidental contact with reinforcing material.

Concrete Mixer. The location of concrete mixers is an engineering problem. Their location must be studied for efficient operation as well as safety. Proper location will also cut down the number of times which they will have to be moved with the attendant dangers of moving heavy awkward machinery.

The passages leading to and from mixers should be as straight as possible. Where such passages, as between mixer and sand pile, are not straight, the radius of the curve which the barrows will have to make should be large. Empty and full barrows should not be made to pass each other during operations except where there is ample space. All elevated walks and scaffolds on which barrows are to be pushed should have guard rails and toe boards. Ramps should be at a low pitch and cleated.

Concrete mixers should never be located in main passages so that other workmen will have to pass nearby the machine. Generous open space around the mixers should be provided and kept clear of sand piles and cement sacks.

Military precision should be maintained among the workmen feeding mixers or removing the mix. Men should not be allowed to crowd, but remain lined up. Routes to and from the machine should be indicated. Men should not be allowed to go and come in any time they please.

When towers and spouts are used in the distribution of the mix, the space under the spouts should be protected and men should not pass under or work under the spouts.

Removal of forms. The removal of forms is in a class with wrecking and is hazardous work. Men should be compelled to wear heavy-soled shoes and should be supplied with good gloves. The work should be undertaken in an orderly manner and always under the direct supervision of the foreman. The "slap-bang" method of dismantling is dangerous. It is no faster than an orderly method and is more destructive of material.

The parts of the forms should be removed in small enough parts to be readily moved when on the ground. There is less hazard in taking the forms down in small sections than in throwing down large sections and dismembering upon the ground.

Dismantled forms should be removed immediately to a distant part of the yard and the nails removed.

Placing of Steel Work. This class of work is very hazardous and only foremen known to be thoroughly experienced and careful should be employed. This employee should be part of the permanent organization of any company which is erecting more than one plant and should be taken from job to job. He may then be thoroughly educated in the company's safety policy. None but experienced steel workers should be allowed to do any work on steel at an elevation.

Men should never be allowed to ride on derrick loads or slide down ropes.

Rivet heaters should be assigned spaces and not be expected to work in odd corners. Scaffolds or platforms should be erected for them if necessary.

Steel should be fastened before riveting with sufficient bolts to withstand wind pressure and standing loads.

Ladders and scaffolds should be provided to eliminate as much climbing on steel as possible.

Welding. Gas tanks should be kept on the trucks which are provided. There are very few cases in which these trucks may not be transported to within working distance. When this is impossible, tanks should always be lashed to prevent their falling and the valves protected from falling material.

Pyrene type fire extinguishers should be considered a part of all equipment and be moved about whenever welding apparatus is moved.

Goggles should be provided for welders and helpers and should be of the type approved by Insurance Companies. A number of extra goggles should always be on hand. Welding operations should be protected so that other workmen will not be continually exposed to the injurious rays.

Pieces to be welded or cut should always be properly supported. In the case of pieces to be cut there should be no strain so that when the cut is complete the material would move and thereby injure the operator.

Before welding or cutting operations start, welders should be instructed to make an inspection to see that there is no combustible material underneath the job and that men are not working in the immediate vicinity underneath. A routine for the examination of regulators and torch hose should be established. Where more than one welding apparatus is employed, one employee should be responsible for the condition of all apparatus. Daily written reports of the condition of apparatus are practical because of the importance of this hazard.

A special building or a special room in the warehouse should be provided for pressure tanks. Tanks should be handled by the operators or helpers or some other workmen familiar with the handling of this apparatus.

Rigging. The art of rigging is one that is acquired only by long schooling and experience. Many workmen, and in fact engineers, are inclined to think that because it looks easy anyone may do rigging. When rigging is done by inexperienced men it introduces very serious hazards.

Before work starts the rigging and tackle, if it has been used on previous jobs, should be thoroughly overhauled and inspected. Tackle which is not fit for use should be destroyed or otherwise disposed of so that workmen may not find it and use it.

All work of this class, no matter how insignificant, should be done under the supervision of riggers. Wherever derricks, lashings, ropes, guys or dead-men are to be used they should be installed by riggers.

Frequent inspection of all rigging should be made. Rigging which is subject to wear and tear should be inspected daily. It is very poor economy to use rigging which has become worn. Riggers of the "Safety Last" class should be eliminated.

Guarding of Sidewalks. Sidewalks along public thoroughfares should be roped off if possible, otherwise they should be protected by as substantial a structure as the work warrants. While such structures come under the heading of scaffolds, they must be more elaborate than the usual scaffold structure.

Stairways. The stairways called for as part of the structure should be erected as soon as possible. If temporary treads are installed they should be made substantial and not out of scrap lumber as is so often the practice. Railings and toe-boards should be provided. Where permanent railings and toe-boards are not parts of the construction, temporary ones should be installed during construction.

It is best to install stairways rather than ladders in many places. The efficiency of stairways increases the general efficiency and eliminates the hazard of ladders.

Ladders. Ladders in general are so hazardous that they should be used only as an expedient. Ladders should be lashed in every case where they are in more or less permanent positions or when they are to be used by other workmen than those placing them. The use of rough ladders made from scrap material should be avoided. If ladders are to be constructed they should be made of the best material and with care and skill.

Floorings. In any structure floors should be placed as soon as the erection has reached floor level. Temporary floorings should be used if necessary.

Floor Openings. In Plant Construction some of the greatest hazards are open hatches, wells and machinery foundation and pits. These are always numerous and should be guarded by railing and toe-boards whenever they occur along passages in the construction.

Machinery. In many large construction jobs small machine shops are installed. Although these installations are temporary all the precautions of guarding moving parts should be observed. As a matter of fact the hazard is greater than is usual in machine shops, because men with small experience in machine shop practice usually have access to these shops.

Motors for power in the shops should be as carefully wired and protected as in permanent installations.

It is good practice to assign one workman as foreman or custodian of the machine shop with authority to regulate the use of machines by the various workmen.

Hoisting Machinery. The placing of hoisting machinery is an engineering problem and when not taken care of in the design, must be given first thought by the erecting engineer. While they should be so placed as to provide for maximum efficiency, the hazard of their use should be

borne in mind. They should not be placed close to passageways or highways. They should be so placed as to make it unnecessary for ropes to cross passages, etc. They should be in the care of persons whom the engineer know to be careful and competent.

Guards should be provided for all moving parts. The operator should not be allowed to remove these guards and leave them off. Frequent inspection should be made for wear and torn parts should be replaced. This is particularly true of brake bands and clutch bands.

The operators should be protected from falling material by a substantial roof if the apparatus is close to the work.

Electrically driven machines require good protection of the electric parts from both persons and the weather. The engineer should be sure that all fused and automatic cut-outs are always in proper running order.

All derricks, masts and booms should be erected and dismantled under the supervision of a rigger when hoisting operators are not in themselves experienced riggers. At the end of every shift all loads and strains should be removed from the hoisting machinery. Elevators should be grounded and booms should be grounded or "boomed-up."

Pipe Work. In the installation of pipe work it is of paramount importance that good tools be furnished and that they be kept in good condition at all times. Pipefitters are required to work under a strain in cramped and awkward positions and at the tops of ladders or on temporary scaffolds. The slipping of wrenches is one of the worst hazards of pipe work.

Pipelifters should be furnished with enough good ladders so that they may reach any point of their jobs. Patent ladders which may be pulled into ladder scaffolds are of great use to pipefitters.

Tapping Gas Mains Under Pressure. Tapping machines and gaskets should be inspected before each operation and should not be used if at all defected. The same is true of bags and stoppers.

Only men who are physically fit should be assigned to this work. It will be found that some men show greater resistance to small quantities of gas than do others. It will also be found that men who have some temporary ailment will lose their power of resistance and become ill or be overcome with only small quantities of gas. Men with bad colds or headaches should be excused from this class of work until they have recovered.

This class of work should not be undertaken unless a resuscitation kit is at hand and unless there is someone on the job who is competent to undertake resuscitation. In confined places belts should be used where there will be the slightest danger that men may not be immediately removed if they should be overcome.

Temporary Electric Installations. Temporary electric installations must be made under the same code rules as permanent installations. They must be guarded or fenced to prevent accidental contact and thoroughly housed if there is any liability of their being damaged by falling material or by material being moved in the course of construction.

It is a good policy to place all electric work and installations under the direct supervision of a competent electrician who will be in charge of safety precautions as well as general installations and maintenance.

Temporary Structures. The temporary office building should be conveniently located but at the same time should not be so located as to be in danger of being struck by falling material or by material which is being moved. It should be so located as to reduce all fire hazards to a minimum in case it should burn or should another temporary structure burn.

Fire extinguishers should be provided. Metal waste cans and waste paper baskets should be provided in place of stray boxes and cartons.

Storehouses are often better located in some other part of the yard than adjacent to the executive office. This building should be substantially built and as nearly fire proof as possible. Shelves, bins, etc., should be skillfully constructed and of good material.

Particular attention should be paid to floors and platforms, which should be smooth and should be built of material of sufficient strength to withstand the loads placed on them without springing. Ample aisle space should be provided when practical. Bins should not be constructed higher than a man can reach, which eliminates the climbing up for material or the use of ladders.

The orderly arrangement of material within and without the warehouses not only leads to economy of operation but reduces fire and other hazards. Fire extinguishers and sand buckets should be part of the regular equipment of any storeroom. Waste, oakum and similar materials should be stored in metal containers and also in a separate house built for inflammable material when practical. Combustible material such as kerosene, gasoline and paint should be stored in a separate semi-fire proof building and in a separate building from that in which oxygen and acetylene tanks are stored.

First Aid. On large jobs a dispensary should be erected as part of the executive office. A man skilled in first aid should be part of the force although his regular duties may be clerical or other work. Minor injuries may then be treated locally at a saving of expense and at the same time there will be treatment for injuries which otherwise might be neglected simply because they are of a character which do not warrant the calling of a doctor.

The equipment of the dispensary may consist of a standard first aid cabinet. These cabinets, completely equipped, may be purchased in nearly every locality. The equipment should include a stretcher.

Sanitary Conveniences. On all operations attention should be paid to the convenience and cleanliness of workmen. On larger operations lockers and dressing-rooms should be provided. Where the conditions warrant, toilet facilities may be installed. Hot water is readily obtained from steam hoisting boilers when such boilers are used.

Attention should be paid to the supply of drinking water. Where city water is available sanitary drinking fountains may be readily and conveniently installed. In hot weather ice water may be provided, but water which is too cold is detrimental to many workmen. It is feasible to use oatmeal in ice water in the hottest weather. Where water from public utilities is not available the water supply should be examined to see that it is safe for drinking purposes.

Bulletin Boards. A well built bulletin board should be part of the equipment of the executive offices. All bulletins and like instructions should be neatly typed and arranged on the board. These bulletins should be kept up to date and not allowed to become torn or weather worn. Only such bulletins as are part of the Company's business should be posted. Safety bulletins may be posted upon this board. They should be changed frequently and always kept in fresh condition.

In those portions of the operation where smoking is dangerous it should be prohibited by "No Smoking" signs. These signs should be located so that they are readily visible and should be kept in fresh condition. It is a good policy to incorporate on the sign the reason why smoking is prohibited, as "No Smoking—Gasoline."

Fire Service. When any construction work starts a fire fighting organization should be inaugurated which is consistent with the size of the job. Specific duties should be assigned to the more or less permanent members of the constructing force.

Fire extinguishers should be provided and located in conspicuous places. They should be protected from damage by proper housing. The housing may be painted bright red.

Some sort of fire signal should be arranged and this signal should be known to all employees.

Consultation should be had with the city fire department on large jobs where conditions warrant. Valuable information is many times obtained by such consultations.

A conspicuous sign should be posted in the office giving the city department's telephone number and the location of pull boxes.

Hand Tools. Statistics show that about 65 per cent of the accidents on construction work arise from hand tools. These should be frequently inspected.

Pneumatic tools in the hands of inexperienced operators are particularly dangerous. Pneumatic tools must be only in the hands of properly instructed workmen.

As a general rule gasoline torches and melting pots should not be carried around or used promiscuously. Safe places should be selected for their use and they should be used in these places only. They should never be left burning without an attendant and should be extinguished when not in use. It increases the efficiency and decreases the hazard of such torches if asbestos screens are provided.

Tar kettles and the like should be placed only in carefully selected places. They should be placed on an incombustible base and be surrounded by sand. Sufficient sand to completely smother the contents of the pot should be at hand. Tar pots should never be heated at an elevation or inside any structure as it increases greatly the hazard of fire or asphyxiation.

DISCUSSION

Mr. Wills MacLachlan (Electrical Engineer, Toronto, Canada): The statement made that one authority states that 60 per cent of all accidents are directly the blame of the man hurt; 10 per cent a fellow workman's

The other 30 per cent the employer's fault, is open to question. The careful selection and placement of men on construction work is it is extremely difficult, but from my experience of construction organizations, selection and placement is difficult and almost impossible to carry out as careful of a plant. The placement of men as it would be in the ordinary operation feel, the exception construction of a property that is not a rush job is, I men it is often impossible to get just exactly what is wanted at the time employee in accident prevention realize the necessity of the education of the employer and construction work, I feel more strongly that the particularly on a construction the supervisory forces is more to the point.

The question of nail injuries of construction with construction jobs. It, however, is often pointed out in connection and difficult piece of work if the nailer, would be an extremely expensive timber that had been used in concrete work had to be all drawn from the forms are used over and over again; also the work. Very often these to be provided for men drawing nails from the forms is the question of space if not more men would be required to draw the nails. At least as many men required in putting the forms up. I have found that the forms as follow-up of first aid dressings to any nail injuries that by very close serious results from nail injuries on construction work prevents any

If the job is not large enough to warrant a full time doctor, it should however, come under the supervision of a doctor. The tendency of placing first aid men and nurses in charge of first aid growing out the supervision of a doctor is not fair to the workman or employer or to the first aid man or nurse employed. Sooner or later a very bad situation is sure to develop, resulting in harm to all concerned.

Too much emphasis cannot be laid on the necessity of a fire prevention and fire extinguishing organization. On a large job this should be organized and carried out just as thoroughly as by a city fire department.

One point that has not been touched upon in the paper is to my mind, one of the most important points in the prevention of accidents on construction work. I refer to a committee having charge of accident prevention. One of the largest pieces of construction that has been carried out in Ontario for some time now nearing completion, has an accident prevention committee, composed of the senior representatives from the

construction, engineering, electrical construction, hydraulic engineering and other branches definitely interested in the work. This committee meets once a week and discusses the accidents that have happened and the hazards in the property. The reduction of accidents has been astonishing.

ACCIDENT AND THE MAN

Mr. E. A. Goff (Peoples Gas Light and Coke Company, Chicago): Carelessness is too often blamed for accidents. To say that a man is careless means he does not care if he is injured. Do you think that any sane man has that attitude? A man's mental condition may, at times, be such that he actually does not care, but in the great majority of accidents, he is thoughtless rather than careless.

Thorough supervision would eliminate many accidents. Each member of the supervisory force must be imbued with the safety spirit. With that for his start, the accident prevention work is assured of maximum success.

In practically every case the accident is caused by one of four things: the man, the material, the method and the tool.

The best ways to combat accidents chargeable to the man are by: selection of men, observation, education and discipline.

Much attention should be given to the safety education of the workman. He must be convinced of the need for the protective devices which are provided, and shown that his interest in safety is paramount to that of his employer.

Discipline or orderly regulation is essential to safety and it should be easily obtained by following the routine just described. It may be necessary some times to penalize a workman for willful infraction of the rules.

In closing, let me relate a personal incident which brought home to me with great force the human side of safety. As I approached my home one evening, a white ambulance drew up in front of the house. My wife and two daughters came to the door and I can never forget the expression on their faces as they saw the ambulance stopping there, and then the relief as they saw me and knew that I was not being brought home in that conveyance. That picture is before me whenever I hear of a serious accident and my sympathy goes out to the family of the injured man.

RUBBER GLOVES

Chairman Mitchell: I am going to call on Mr. Warren, who is here representing the Blackstone Valley Gas & Electric Co.

Mr. Warren: You all know the old test where we used to take the rubber glove and take it by the two corners and whirl it around until we closed up the end and then press it. If the air leaked out, it was plain enough to see that the glove wasn't fit for handling high voltage.

We work our lines dead, especially over 2,300 volts, but we like to be absolutely sure on our part that the Blackstone Valley Gas & Electric Co. and the various Stone, Webster Corporations are doing everything

they can to eliminate the hazards for the men. So it was suggested that we have some form of testing those gloves beyond that usual air pressure test, and one of our foremen got up this machine. It is simply a metal tank inside of a wooden box, to keep the men away from the metal, filled with water, holding somewhere around 150 gallons, I believe, roughly. The electric connections are made across the top part of the cover to hang the gloves on, the gloves are filled up with water and lowered down into the water of the tank. There was formerly quite an elaborate device there of a round circle to fasten those gloves on, but we found that these ordinary snap clothespins were just as good and a good deal quicker in holding the glove on to the little copper wires that hold the glove on to the top electrical connection. For safety on that, we have a connection on to the main switch, so that the main switch can not be closed until that upper lid with the glass front is let down.

Over here on this side of the box, on the metal tank, there is another connection which connects up with the high voltage on to the round section of the tank. The voltage is run up through a common rheostat electrical resistance, which we can graduate by pressing down on the handle, and that runs the voltage up through the ordinary distribution transformers which are placed up in the wall to step up the electricity to eleven thousand volts. There is a circuit breaker in the line and different voltmeters and ammeters to get the proper tests.

It is quite interesting to see the way the different makes of gloves, etc., stand up under those electrical tests, and perfectly good gloves to appearance will break down on six thousand volts and prove out that we were absolutely right in making such a machine.

Mr. Lueck: The question has always come up whether re-tested gloves, even though they do stand up at 6,000 volts, are not materially weakened on the re-test. In making these tests, I have had quite a bit of experience in that, and I find that you might test a piece of rubber and get the required test, and then just applying it again, it will break down. I would also like to have answered the question, how long you hold that test on on the re-test?

Mr. Warren: We put it through the standard test. It takes about a minute, I believe. We used to test them at 10,000 volts, but that was too much of a strain and we reduced it to 6,000 volts.

ADJOURNMENT.

Joint Meeting of the Public Utilities and Electric Railway Sections

October 3, 1923

A. O. MITCHELL, Chairman, Public Utilities Section
Adjuster, Northern Indiana Gas & Electric Company, Hammond, Ind.

J. H. TRUETT, Chairman, Electric Railway Section
Chairman, Safety Committee, United Railways & Electric Company,
Baltimore, Md.

WEDNESDAY MORNING SESSION

CHAIRMAN MITCHELL: The first address this morning is by Mr. James P. Barnes.

THE AUTOMOBILE HAZARD

JAMES P. BARNES, PRESIDENT, LOUISVILLE RAILWAY COMPANY, LOUISVILLE, KY.

I suppose that most of you follow the *Litany Digest*, and probably you saw an article under the title of "Gasoline Arabics" which in very startling statistics reviews the automobile casualty situation. This statement was made: that a person was being killed in the United States every 50 minutes by automobiles, and that before 1923 was ended, one person out of every 90 in the United States would have been killed or injured. Statistically, that is almost incomprehensible, and compares so unfavorably with previous years and is running up so rapidly that there must be some very deep underlying cause for it. I think it was the *Santiago Union* that said the people of this country are too intelligent to permit this wholesale slaughter to continue on the highways that we are to maintain. But the facts don't seem to bear it out.

I have thought, sometimes, that the automobile traffic on the highways lacked a very essential feature which we had in the old days of vehicular transportation. Then, at least, we had horse sense, but there is a conspicuous lack of it behind the steering wheel in a great many cases.

The record of accomplishment by law in some places has been good. I was astounded as I drove through Cleveland to see how carefully traffic seemed to observe the speed limits, how cautious people were in crossing streets. I made some inquiries and found that Cleveland had established the habit of impounding the cars of speed ordinance violators and they had to pay storage for the auto during the time they were

forbidden to drive. How much of the careful driving is due to that I cannot say, but it compared most favorably with other cities. When I awakened in Buffalo the next morning, the contrast was most marked. As one goes from city to city there is a vast difference. And where the law has been enforced impartially there seems to be a considerable improvement in the caution with which people operate the automobile.

Safety campaigns have some effect, and it is noteworthy to see the effect they have on children. Children, of course, think more simply and directly than grownups, and once they have accepted the conclusion, once they have come to believe a certain thing is dangerous because they have seen it in practice or have been told by their parents or teachers they are more apt to be guided by that than the adult who has learned "to take a chance."

In considering the underlying condition that brings about all these things it seems to me, (speaking generally and largely not from the specific type of accident but care and consideration for others in the operation of automobiles all over the country) that we are confronted with a basic condition.

THE SPIRIT OF UNREST

America today is in the most restless condition that any of us have seen. I think there is unrest in every direction, and the unrest manifests itself in almost every activity of life. There is a group of people who want to amend the Constitution of the United States. I am told there are 100 amendments to that document that are prepared and ready for introduction into the next session of Congress, and that they cover all manner of subjects. There are those who want to curb the power of the Supreme Court; there are those who want to abolish this amendment; there are those who want to abolish the Constitution entirely.

Generally people seem to be dissatisfied with something or other, or with several things, and the tendency seems to be to rush into the legislature with all kinds of untried ideas, and then there are others who want to repeal that legislation before it has had a chance to operate. The restlessness is tremendous. So I am brought to the conclusion that the real underlying trouble with this automobile hazard that produces the figures I have quoted from the *Literary Digest* is one of the effects of this state of mind on the part of the American people.

Safety campaigns, as I said, will undoubtedly do something, but they can hardly do more than scratch the surface, that is, unless the old method of "common horse sense" is restored, and more than that, a return of the spirit of human kindness behind the steering wheel.

It is to me one of the most significant things about the safety movement that for the first time in all the years that I have lived, and those of the oldest man in this room, that there have been placed before the public scriptural quotations surrounding this subject and dealing with it with a force and abundance that I think no other period of the world's history has produced.

Now we have got to go back to the first principles in dealing with the fundamental conditions, and it is tremendously heartening to see the world, particularly through such agencies as safety campaigns answering the question of Cain in a very definite and favorable manner, "I am my brother's keeper." I have a responsibility toward society and each individual in society, and it seems to me that we must keep up our campaigns for safety; we must continue to try to stir in individuals that the duty to society is not only of self-protection but protection to others, and that we must continue our definitely formulated and formal agencies with all the force within us, and with all the force that can be put into them, but we must, each one of us, constitute ourselves as centers of energy in the distribution of propaganda that the laws must be observed. That is, the laws on the statute books, the laws of human relationship must be observed and this world must come to a place where each man will feel in himself some definite measure of responsibility for his fellowmen.

SPEAKER PLEADS FOR LAW ENFORCEMENT

I think that every one of us must definitely get behind the enforcement of the laws so far as we are able as individuals, and if every individual will take that thing seriously to heart and do his best in his individual station of life and capacity to see that all laws which are written are enforced, then results will begin to come, and it is important that all laws be enforced. The contempt in which certain laws are held cannot help but weaken the respect for other sections of the law, and I want to say that the enforcement and upholding of the Fourteenth Amendment to the Constitution of the United States has been of such vast importance that I think we can afford to see that other emendments of the Constitution are enforced. I mean the Eighteenth Amendment.

If any of us reach a conclusion that any particular part of the organic law of our country is unfavorable to us, we can hardly blame the fellow who finds another part of our organic law antagonistic to him. The great, general body of law under which the Constitution was delivered was not democratic. (There has been too much talk about democracy lately.) It is that which our forefathers tried most successfully to advocate—it is a representative government founded upon broad general principles, and it is up to us as American citizens to see those principles observed. That is the foundation upon which we must build from the standpoint of the law. We must go back to our first principle both of the Old and New Testaments and we must not rely upon the Twenty-Third Psalm in this matter of safety. We have to find other scriptures. The Lord is our Shepherd all right, but He will not take care of us until we have a sheep dog or do something ourselves. Bear in mind that 100 people have passed away and 100 new babies have been brought into this world while I have been talking to you this morning. We must see to it that our schools not only do safety work but see to it that the laws and traditions of this great American people are properly presented to the oncoming citizens, so we

may leave the children the understanding of the tremendous birthright that has been ours and that will be theirs, and we should protect them and they in turn shall lead us to safety.

DISCUSSION

Mr. H. L. Mitchell (vice-president, West Penn Railways, Pittsburgh, Pa.); To reduce the automobile hazard to plain statistics of accidents per car mile or damage costs per car mile while conveying much to the operating official means nothing to the public. Were automobile drivers organized so that statistics were available, I feel sure their mileage records would show a much lower rate. There are approximately 13 million automobiles in this country and allowing an average distance of 10 miles per day per automobile the startling mileage of 130 millions is obtained. If automobile statistics were available and showed a record comparable with some electric railways of 154 accidents per 10,000 miles the amazing total of 8,441 accidents would occur daily. This figure may or may not approach the actual number, but facts obtainable are sufficient evidence to warn the railway manager that the automobile hazard is the greatest menace to operation.

The railway industry has done much to eliminate accidents and practically every class of accident has been reduced except automobile collisions which in spite of all precautions taken continue to increase. What must the railways do to warn the careless driver? It's hard to reach the individual until experience has taught him. Unless energetic methods are used to curb this steady growth, there is no way of predicting how much worse the situation may become. The problem is relatively new and methods that have been successfully used to reduce the number of other classes of accidents are not sufficient for present day conditions.

We believe that the intelligent cooperation of the railways companies and the public is essential to the success of any plan whose object is to minimize the automobile hazard. When railway companies seek the help of others, to be successful, they must come with clean hands. That equipment should be kept in safe operating condition goes without saying. It is equally certain that wherever necessary, warning and other safety devices be utilized to the fullest extent. Trainmen must be educated in safe practices and expected to follow them. They should have every encouragement and full cooperation. In addition to this, we feel that the companies should give the men some inducement that will make their interest in accident prevention and that of the company identical. In the past it has been the practice to discipline trainmen for being unusually careless, but, speaking generally, we have failed to reward those who were unusually careful.

On January 1st of this year, we started a program for the elimination of accidents. First, we divided trainmen in each division into teams of from 12 to 18 men and pitted them against each other in order to arouse a spirit of friendly rivalry. A quarterly record is posted in each crew room on which is indicated the number of accidents chargeable to each team.

At the end of each quarter, teams that had the least accidents in each division are given a dinner by the company. These are made worthwhile occasions and rivalry to be among those present, is keen. These gatherings are also utilized as a means of receiving suggestions and exchanging ideas on accident prevention. Cooperation is fostered between the trainmen and the track and roadway and shop departments by having representatives from these two groups present. Local newspaper men are invited.

This plan was quite successful and while it rewarded teams there were many individuals whose excellent results went unrewarded. Four months later we adopted the individual reward in addition to the team. The award increases progressively from one dollar in the first no-accident month to \$10.00 in the 10th month, with an extra \$25.00 at the end of the twelfth month. A trainman may earn \$100.00 for the first twelve months of no-accident record, and \$150.00 during the next consecutive twelve months, the extra award at the end of this period being \$30.00. Coupled with the contest plan, this gives the trainman a real incentive to boost and work for accident prevention.

We have been supplementing these efforts by the use of safety meetings, illustrated safety bulletins in waiting rooms and barns, car cards and dash posters.

REPORTING FLAGRANT VIOLATIONS OF THE HIGHWAY LAWS

We also make it a practice to report flagrant violators of the highway laws and with the cooperation of the state constabulary and the state highway department, have been instrumental in having several drivers' licenses revoked or other punitive action taken. This acts as a deterrent to the wantonly careless driver, and causes employers to be more careful of the type of men employed to operate their motor vehicles.

In this connection, also, it is our practice to bill automobile owners for damage to company property caused by their machines and for which we are certain they are responsible. Although we do this largely because of the moral effect, our experience has been that approximately 45 per cent of the total of all such bills has been paid.

As was mentioned before, the growth of the automobile hazard can be curbed only as a result of cooperation between the railway companies and the public. We feel that the measures we are taking are earning for us the right to ask for and to receive this assistance in the handling of a mutual problem.

It is our purpose, now, to lay the situation before public officials, newspapers and the civic bodies in our territory. Automobile clubs must be asked to help. The aid of Rotary, Kiwanis, Lions and other clubs will be enlisted. Public schools can be of service. Community safety movements must be fostered.

We are constantly appealing to public officials to correct parking evils and traffic regulations, and even extend invitations to mayors, public safety directors and chiefs of police to ride the front end to observe the carelessness of the automobile driver.

The net results of our efforts to avoid accidents for eight months shows a slight decrease in the number of accidents, but auto collisions have increased 40 per cent. The encouragement we get is that our trainmen are more alert, having greatly reduced the number for which the railways is liable and effecting a satisfactory reduction in the charges against Injury and Damage Reserve account. We are putting the burden on the other fellow.

Our program has not been forced upon us because of excessive accidents costs. We have been running about 2½ per cent of gross and feel that is not at all bad for our property. We have come to this, rather, because conditions are becoming worse with schedules being slowed up and destruction of life, limb and property due to this new hazard constantly growing. It stands at the top of the list of causes of accidental deaths.

To repeat an earlier thought, the railways companies must first clean house themselves, and then become pioneers in fostering the safety movement in their communities. Only then will their automobile hazard cease to grow.

THE DRIVER, NOT THE AUTO, IS CAUSE

Mr. R. R. Hadsell (Superintendent of Transportation, New York State Railways, Rochester, N. Y.): We are prone to refer to the automobile hazard or the dangers of the automobile in a manner that would give the impression that the automobile is our greatest agency for destruction. It is true that the number of fatalities in which automobile is a factor are so large as to be startling. This however, is due in a far larger measure to the inherent tendencies of the individual driver to be reckless or thoughtless than it is to any mechanical imperfections of the automobile.

Thus far, it might seem that I am speaking in defense of the automobile. In the sense that it is the abuse rather than the use of the automobile that causes accidents, I am.

All of you number among your friends and acquaintances men and women who have driven automobiles for years and have yet to have their first accident. I mention this by way of illustrating that auto accidents are not inevitable or workings of fate. Again in that same group of people you may find a number who have had accidents.

Why have they had them? Someone else may have run into them, a steering knuckle might have broken, a tire may have come off at a time when it was particularly dangerous to have such a thing happen. All of these are possibilities, yet the odds are that more often than not the accident might properly have been attributed to a desire to beat the other fellow to a crossing or into a lane of traffic, or to indifference to the rights of others.

Railroad crossing accidents are alarmingly frequent. The pity of it is that the victims are frequently women and children who have no power to save themselves but are sacrifices to the recklessness of the driver of the car in which they happen to be riding.

Many of these accidents occur at crossings where warning signs have been conspicuously placed, where an unobstructed view of the crossing may be had for a distance sufficient for a machine traveling at a reasonable rate of speed to be readily brought to a stop. The popular demand is for elimination of grade crossings. This is being done but grade crossings are so numerous and the money involved in their removal is so enormous, that it will require many years to materially reduce their number.

A number of states have enacted legislation making it compulsory for autoists to come to a full stop at all railroad crossings. Failure to heed the warning signs placed by the railroad and the highway commission is taken as *prima facie* evidence of contributory negligence on the part of the autoist who is involved in an accident at such a crossing.

FOREIGNERS ARE RESPONSIBLE FOR MAJORITY OF ACCIDENTS

In reading accounts of automobile accidents, has your attention ever been attracted to the names of the persons involved? Have they not, in the majority of cases been foreign names? That has been my observation. Many of these people cannot read or write the English language, do not know our traffic laws, do not carry insurance on their cars and many times are not financially responsible and so do not and cannot make restitution for harm done.

I am a firm believer in the efficacy of the drivers' license. An auto driver myself, I should be glad to take such an examination as might be required to prove that I am sufficiently skilled in the handling of a car to be permitted to drive on the streets of the city. If every driver were required to pass an examination to determine his fitness to drive and if such license might be revoked for just cause, many accidents, I believe, would never happen. Where a driver of an auto is shown to be guilty of recklessness and where his recklessness results in personal injury to another or in the destruction of the property of another he should be denied the right to drive a car for such time as might be determined by those in authority.

This, to my mind would be far more impressive than fines.

Our safety councils should endorse the efforts of the magistrates in their respective cities who are endeavoring to curb the reckless motorist. Progressive automobile clubs are and should do the same things. When a number of organizations that are interested in community welfare, publicly endorse an effective law enforcement program, the reckless element which happily is in the minority will soon come to a realization that they have no friends and are being regarded as undesirable and unnecessary.

In a word, I would say in conclusion that the solution of the accident problem as it relates to the operation of vehicles on our city streets and public highways lies in rigid law enforcement by our regularly constituted authorities backed by the sentiment of the law abiding citizens of the community and a continuous education campaign that will awaken all drivers to a realization of their individual responsibilities.

MUST REACH OUT AND HELP OTHERS

Mr. Wm. Bruce (New York City): We must not confine ourselves to the safety in our own lines, but must reach out and help others. Many of you, no doubt, remember reading in the papers about a police officer in the city of New York who was clinging by his hands to a girder on a 20 story office building that was being erected on Broadway, and who was jumping from girder to girder. When I picked up that Sunday paper and saw that picture I thought it was not a proper thing for a policeman, whom we look up to as a guardian of the peace and safety to be doing such hazardous stunts as that. I wrote a letter to Commissioner Enright of the Police Department and got a letter back by return mail stating that that police officer was not one of the regular uniform men, but belonged to the police reserve of the city of New York and had been an air service man and was doing stunts to get money. Commissioner Enright thought my point was well taken and ordered that practice stopped, and I did not see any more of those stunts. But, the point I want to bring out here is that we should go outside of our own industry to call attention to things like that. The same applies to the man who climbed up the face of the Martinique Hotel and when he got to the eleventh floor he lost his hold and was killed. Thousands of people were watching that performance. That should not be allowed, and I think all such practices should be stopped.

Mr. J. F. Conner (Philadelphia): I think that every driver of a car should be examined on application for a license by a physician as to his physical ability, whether he is able to drive a car, or whether he is in a proper condition to drive a car.

Mr. Guy R. Radley (Safety Engineer, The Milwaukee Electric Ry. and Light Co.): I feel that the street car passing up and down the streets of the city is one of the best billboards that we have. It has this advantage: the street car is adjacent to the accident. I have more confidence in a sign that is carried by a street car for reducing accidents that occur between automobiles and street cars than something that might be carried in the daily paper that might be read when a man is not traveling on a car.

Mr. R. M. Searle (President, Rochester Gas & Electric Corporation, Rochester, N. Y.): In Rochester we had a crossing where a number of people were killed and we put up a sign stating that such-and-such a number had been killed at this crossing. All the time that sign was up there they did not have an accident; after it was taken down, five were killed. I have been criticized for emphasizing the hazards in our own business, but why not tell a man that his death is ahead of him? Do you know that a trolley car never chased a man up a concrete road? I saw in the Telephone Journal that a telephone pole never did hit an automobile unless it was in self defense. The hazard with the automobile is not in the car but in the driver as was brought out here a moment ago.

THE USE OF FLASHING LIGHTS

Mr. Radley: We believe there are many people who, driving late at night or early in the morning, are not mindful that probably a car is coming around the curve, and the street car cannot stop and the motorist

cannot stop and there is a collision. A red light means danger, and a flashing red light is ten times more effective than the stationary lamp. Our plan is to place those lights at the dangerous places and feed them from the current from the trolley wire. This type of flasher is now being used in the city of Detroit. What do you think of this, gentlemen?

Mr. C. B. Proctor (Chairman Safety Committee, Memphis Street Railway Company): At our particularly dangerous crossings on the boulevards we have a sign "Drive Slow" about 150 feet before the crossing is reached. Then at about half way between that sign and the railroad we have a raise about 15 inches high clear across the road. They cannot drive over that raise and not know it.

Mr. Chas. B. Scott (General Manager, Bureau of Safety, Chicago): There is one phase of education that has not been touched upon and that is the power of example. It has been my observation that the average safety man is not much more careful about the operation of his automobile than the average citizen. I am making an appeal to the safety men in public utilities to set the power of example in the operation of their own cars, as it is one of the most important and fundamental and probably one of the first things to be done.

Mr. DeBlois: I want to back up what Mr. Scott has said. I was talking with a very prominent safety engineer today who upset his car on a perfectly level stretch of road, with his wife and child in it. In the United States the total number of deaths from automobile accidents to date is 102,000. One hundred and two thousand automobile deaths!

Mr. J. H. Truett (Chairman, Safety Committee, United Railways and Electric Company, Baltimore, Md.): We should have dignity in safety. I think that the railroad signs should all be standardized so that when a person drives he may know when he is approaching a railroad. There are so many railroad signs today that lots of people do not know they are near a railroad. You all know as well as I do that the old cross-arm sign is the railroad signal. I think the study of standardizing the railroad sign is one of the greatest problems we have.

VALUABLE SOURCES OF INFORMATION ON ACCIDENT PREVENTION NOT GENERALLY UTILIZED

**W. F. CANADA, DIRECTOR OF ENGINEERING, NATIONAL ELECTRIC LIGHT
ASSOCIATION, NEW YORK CITY**

This is an appointed time to speak of Safety—which, I take it, is the subject of ways and means of postponing the time to die. Safety is no new subject and besides the tradition of safety from its haziest beginnings, there is the literature of Safety, by no means small in any age, and becoming enormous in present times. Some of this safety tradition and literature has been in season and much has been out of season.

Safety, like other vital human purposes began as an aim and has developed into methods for securing that aim. "Self preservation was the first law" we are told and a study of history will bear this out. Observations of children and animals will confirm our judgment that self-

preservation not only was the first law but continues to be the most natural law of conduct of sentient beings. But with the social and mental development of man there have come about more or less approved methods for securing safety under various recurring sets of conditions for which mere instinct would afford no protective guidance. Those proposed safety measures are best and can be most widely recommended and used, which, by and large, save more than they endanger. In fact, none should be classified or considered as true safety measures, however necessary they may be for human advancement, unless they result in a large and certain increment of safety to society as a whole.

The classification of dangers and the determination of measures, for their avoidance, together with appraisal of the costs and benefits of avoidance, constitutes the science of safety engineering. The process of putting these measures into effect is the art of safety engineering or of accident prevention, as it is called in the title assigned me. The first characterization is the better, broader term and its use predisposes us to more positive, aggressive and resultful programs. Broadly, there may be no accidents, and still safety may not be perfectly assured. Conversely, with Safety assured to the highest degree currently practicable for the safety engineering art, accidents may still happen, and injuries assuredly will happen. Assuring safety is our stated aim in this National Safety Council with all its constituent societies, with the high purpose of limiting adequately both accidents and non-accidental injuries, incidental to our advancing civilization.

In this Council we have an organized intelligence aimed at the greatest practicable promotion of those advances of civilization which obliterate dangers in the arts in which they constitute advances, whether the advances are solely for the purpose of overcoming these hazards or not.

ARE FORMULAS SIMPLE, CLEAR, ADEQUATE?

To direct safety engineering intelligently in its various applications to all the arts, requires men of honesty, human kindness and breadth of vision. It also requires effective organization of such men. Many of these men must be thoroughly versed in the arts themselves to which the safety engineering is being applied and not wholly or even mainly, in the safety aspects. We have passed out of the superstitious period in safety engineering and we now have engineers—analyzing and appraising every safety proposal and every recorded experience of hazard or its avoidance.

But there are obstacles to our entire success in safety work. Are we making full use of all existing facilities? Do we lack important available facilities? As with all activities, there arise milestones at which we must pause and take stock, if we would not retrace many footsteps at much cost. We have our enthusiastic safety engineers, and we need all possible enthusiasm. But every enthusiast necessarily follows formulas or standards.

Two reliable and time honored criterions for examination of our current methods exist,—the judgment of trained men and the comparison of the methods with intelligently arranged data on experience.

Let us then examine briefly into some of the sources of information on safety engineering available to us, or which can and should be made available and perhaps raise a question as to why some of these criterians for developing our present methods are not more generally utilized today. We may once for all emphasize and regret the greatest cause of all for failure on our part to utilize all the standards now available.

AGENCIES ACTIVE IN SAFETY WORK

Within the membership of this National Safety Council are now comprised most of the organized agencies whose activities consciously embrace safety engineering. In the files of the library of the Safety Council are contained an astounding number of discussions, proposals, and codes of safe practice, covering scores of the hundreds of activities to which safety engineering may profitably be applied. Some of these pamphlets may not be entitled "Safety" or "Accident Prevention" because this may not have been their principal inspiration or scope. The librarian of the Council, however, has these documents well classified from the Safety viewpoint, and is in a position to secure later editions or timely and expert comment for the information of any member. Often time would be saved, instead of lost to members if they would canvas the existing data, instead of endeavoring to evolve new methods out of an inner consciousness certainly limited and perhaps unfortunately biased.

In respect to the actual recommendations for safety practice which will be found in its library, the Safety Council acts purely as a correlator, a repository and a quickening spirit. We see the material there collected,—we are inspired,—and our working organizations prepare or modify or extend the safety codes of practice which are building up about every advanced mechanical art or activity. Acting co-operatively with the various technical National Electric Light Association committees concerned, it prepares and develops safe construction, design, installation and arrangement methods for electrical plant in all its phases. Thus it has been closely concerned in developing from its very beginnings, the National Electrical Safety Code which, besides its own safety producing value, has had immeasurable value in pointing the method and form for flexible, developable codes of Safety Practices.

Similarly, there are the reports, tentative proposals, warnings, etc., which this National Electric Light Association committee and similar of other utility associations have on file which have not yet reached the dignity of codes but must be considered as Codes in the making. And these committees are furthermore prepared to advise, check and promote any safety suggestions submitted for their examination. If a positive recommendation is not properly forthcoming, they can at least keep individual workers in their own and other societies from ignorantly traversing old ground with painful undirected efforts or new ground with clearly

misdirected effort. These individuals and committees may be at fault. Certainly, we are, if we do not ourselves, remember and "tell the world" where this information is to be obtained. We have spent too much human effort to allow it to fall by the wayside.

CODES—SOURCES AND CHARACTER

Our existing data, available in the Council library, or through the various working committees of the constituent associations, is divided into three main divisions—codes of practice, general dissertations including recommendations and warnings or histories conveying warnings. Codes will and should come earliest on any practice which affects many associations, many sections within a given association, or even many groups of persons, but in different ways. Thus, interior electric wiring, affecting householder, contractor, inspector, insurer and service utility in different kind and degree was the subject of a very early code of safety practice, the National Electrical (fire) Code. Not until many years afterward, did the extension of overhead lines and the necessary increases in energy transmitted and used, lead to development of the National Electrical Safety Code.

Fortunately, however, means for checking such discreditable rivalries have been developed, and may now be considered fairly reliable. Among these are the Bureau of Standards at Washington, also the Bureau of Mines, the Public Health Service and various bureaus in the Department of Labor. Another group of such agencies exists in the associations of Administrators of Codes, such as the national associations of state utility and labor commissions. Recently, the American Engineering Standards Committee has been formed, embracing all these code-making organizations, to stimulate, correlate, restrain and, it is hoped, to rationalize the general codification program in safety as well as other fields.

CODES IN THE MAKING

Next to codes in importance come the dissertations of various organizations which, by the very fact of their wide and selected distribution, exert a great influence for good and are indeed the seeds of codes, yet unborn.

Such embryo codes are a natural and necessary stage in the process of code making, but should not be allowed to be clothed with apparent or real authority, however brief, as to damage the general cause of safety both by improprieties and by the enormous effort often required to secure proper review and rescinding of such proposals by bodies which have rashly committed themselves to the courses of action they outline. Our principal standardizing bodies and particularly the American Engineering Standards Committee, are proving valuable in connection with the avoidance of improperly characterizing as "standard" a mere proposal of individual or society.

STATISTICS

Immensely useful, also, are the statistics of injuries. Publication of these lists of injuries, where they will be intelligently discussed and

so aid toward correction of practice, is so essential that their occasional misuse by malicious or ignorant readers cannot be considered a sufficient deterrent.

Injury statistics, as opposed to fire statistics, it must be noted, contain greater personal elements in the immediate causes for the injuries which are the main basis for such statistics. Since these personal elements are elusive, the statistics are not quite so reliable for indication of the causes. Such statistics, however, with this limitation recognized serve the following principal purposes:

First: They reliably indicate the kinds of workmen, the kinds of work and the kinds of location where injuries occur with greatest frequency and severity and to the highest percentage of the persons subject to hazards concerned. This properly directs the principal attention of the reader to these groups of workers, these kinds of work, these locations.

Second: Injury statistics indicate the individual features of construction and of working methods, which contribute largely to the frequency and severity of injuries. This analysis of specific causes has a large element of uncertainty since the human failings and errors contributing to injuries are often pride or ignorance. If human weaknesses are too often concerned in a particular type of injury and are too difficult to remedy, mechanical substitutes for personal caution must be sought to limit the toll exacted by our processes of civilization.

Third: Injury statistics throw light on the desirability or undesirability of current habits of practice in construction, operation, maintenance. To build, anew, a code of practice wholly out of such statistics seems absurd, yet it has been conceived and attempted by unrestrained enthusiasts.

PUBLIC UTILITIES IN SAFETY WORK

To no branch of human industry does safety engineering appeal with stronger force or meet better organization than in those public utility groups which are represented in today's meeting of the Public Utilities and Electric Railway Sections of the National Safety Council. Each utility meets its public so closely and on such an understanding and essentially co-operative plane that the natural human impulses toward safeguarding are kept constantly alive, developing and functioning. The margin of utility income above expenditure, closely regulated, as it is, in the public interest, requires and obtains a minimum of expenditure by the utility for injuries and this minimum, as theory and experience both indicate, will result from intelligent application of recognized Safety engineering principles. We all feel and properly feel, a pride in the inherent safety and helpfulness of our utilities and a desire to enhance these advantages and publish them to everyone. Justifiable optimism should be expressed no less clearly than pessimism, whether justified or not. usually is.

My observation of men and methods in Safety work during the past twenty years has led to certain conclusions, and is constantly confirming them, as to what are the vital essentials for success. While fully aware that there is nothing novel or startling in these conclusions, and although confident that most of this audience of earnest men have arrived, or are arriving, at the same conclusions, I believe that these conclusions should be voiced and reiterated until they become so graven on our roadsides that he who runs may read, and a wayfaring man, though a fool, cannot err therein.

The first conclusion is that men of broad vision, courage of conviction and long training in safety work serve better in promotion of safety than do casual workers or men of less training. This Council is a foremost and indispensable agency for securing training, retaining and correlating the efforts of such trained men. Trained and restrained in this school of thought and experience, we can well depend on the active field work and the subsequent directive work of the younger men who today are working in your industries under your direction and who will gradually take your place as you move beyond. Young men for action; old men for council.

COMPETITION BY GOVERNMENT "SO CALLED"

The second conclusion is that fair and sane government is impossible by a governing organization which, at the same time, competes with those citizens it pretends to govern. It is a human impossibility which has been recognized by thinking men all through the ages. The reason that led to the formation and benefits of organized states and their governments were to assure fair and equitable protection of all citizens and to disallow any assumption to superiority over governmental regulations by any citizen. This same reason applies also to the necessity for avoidance by governing bodies of such control by factions of citizens by whatever name called, as is intended to result or does result in apparent competitive advantage by those controlling the government over those with the so-called government is made to compete.

Experience and judgment are a powerful corrective and as a result, our American people, by and large, refrain from permitting factions, in control of their governments, state or city, from entering competitive industries. And where these competitive activities of governmental factions have by some means arisen they are usually soon overturned. This Council, with its prestige, its secured disinterestedness and its many sided knowledge of the facts of hazards and their remedies may well serve to correctly inform citizens thus subjected to misgovernment.

A third conclusion is that neither a four-hour-day as so cheerfully prognosticated for the coming 21st century by Dr. Steinmetz, nor the eight hour day as so widely popularized by propaganda, will serve to keep and extend the beneficent influences of Safety work. It needs constant sleepless effort. Occasional meetings, including such fine assemblages as this can serve only as in inspiration, stimulation, the extension and unification of our aims and methods. The real application and vitalizing of our

safety work is in constant inspection, constant improvement in plant and personnel, constant well advised and well directed effort of trained, devoted, but not fanatic men, constant application of the best information our sources of information afford. Eternal vigilance is the price of Safety.

AUTOMOTIVE

Motor and Accessory Manufacturers Association, 33 W. 42nd St., New York City
National Automobile Chamber of Commerce, 366 Madison Ave., New York City

CEMENT

Portland Cement Association, 111 W. Washington St., Chicago, Ill.

CHEMICAL

American Association of Textile Chemists and Colorists, Care Clark Thread Co., Newark, N. J.
Manufacturing Chemists' Association of the U. S., Woodward Bldg., Washington, D. C.
National Association of Finishers of Cotton, 320 Broadway, New York City
National Association of Printing Ink Makers, Inc., 15 E. 40th St., New York City
Paint Mfrs. Association of the U. S., 509 The Bourse, Philadelphia, Pa.

CONSTRUCTION

American Railway Bridge and Building Association, 319 N. Waller Ave., Chicago, Ill.
Associated General Contractors of America, Inc., Munsey Bldg., Washington, D. C.
Atlantic Coast Shipbuilders' Association, 1701 Walnut St., Philadelphia, Pa.

DROP FORGE

American Drop Forge Institute, 1163 Hanna Bldg., Cleveland, Ohio.

ELECTRIC RAILWAY

American Electric Railway Association, 8 W. 40th St., New York City

METAL

American Foundrymen's Association, Marquette Bldg., Chicago, Ill.
American Iron and Steel Institute, 61 Broadway, New York City
American Hardware Mfrs. Association, 1819 Broadway, New York City
American Malleable Castings Association, 1900 Euclid Ave., Cleveland, Ohio
National Association of Brass Mfrs., 139 N. Clark St., Chicago, Ill.
National Founders' Association, 29 S. LaSalle St., Chicago, Ill.
National Machine Tool Builders' Association, 817 Provident Bank Bldg., Cincinnati, Ohio
Pressed Metal Association, Hanna Bldg., Cleveland, Ohio
Tap and Die Institute, 116 W. 32nd St., New York City

MINING

American Mining Congress, Washington, D. C.
Coal Mining Institute of America, Chamber of Commerce Bldg., Pittsburgh, Pa.
Mining & Metallurgical Society of America, 115 Broadway, New York City

PACKERS AND TANNERS

Institute of American Meat Packers, 509 S. Wabash Ave., Chicago, Ill.
Tanners' Council of the U. S. of America, 41 Park Row, New York City

PAPER AND PULP

American Paper and Pulp Association, 18 E. 41st St., New York City

PETROLEUM

American Petroleum Institute, 17 W. 44th St., New York City
National Petroleum Association, 823-25 Guardian Bldg., Cleveland, Ohio

PUBLIC UTILITIES

American Gas Association, 130 E. 15th St., New York City
National Electric Light Association, 29 W. 39th St., New York City

RUBBER

Rubber Association of America, Inc., 52 Vanderbilt Ave., New York City

STEAM RAILROADS

American Railway Association, 75 Church St., New York City

TENTILE

American Association of Woolen and Worsted Mfrs., 45 E. 17th St., New York City
American Cotton Mfrs. Association, Commercial Bank Bldg., Charlotte, N. C.
National Association of Cotton Mfrs., 45 Milk St., Boston, Mass.
Southern Textile Association, Greenville, S. C.

WOODWORKING

National Lumber Mfrs. Association, 1319 F. St., N. W., Washington, D. C.
 Northern Hemlock and Hardwood Mfrs., Oshkosh, Wis.
 Southern Pine Association, Interstate Bank Bldg., New Orleans, La.
 Southern Sash Door and Millwork Mfrs. Association, Candler Bldg., Atlanta, Ga.
 West Coast Lumbermen's Association, Henry Bldg., Seattle, Wash.
 Western Pine Mfrs. Association, Yeon Bldg., Portland, Oregon.

DISCUSSION

Mr. Mills MacLachlan (Electrical Engineer, Toronto, Canada): I would like to put forth one suggestion to the incoming executives of the Public Utilities Section. The new members of the committee do not always have a knowledge of the past committee's work, and I would make the suggestion that this committee be appointed to go over the talks that have been given before the Public Utilities Section back to 1915 and bring out some kind of an index so that those of us that refer to the proceedings from time to time can find, quickly, what we want.

The only examination that would be of benefit to drivers would be to find out how careful a man was going to be in driving his car for the next six months, but the licensing of the skill of the driver is never going to prevent accidents.

LUNCHEON SESSION

Toastmaster Charles B. Scott: I heard an indictment in the Public Utilities this morning that I thought was not a proper one and that was the indictment of one class of Public Utilities for its apparent lack of interest in the Safety Movement. One of the wonders of the Safety Movement that I have observed by attending the past congresses of this Council is the rapid development of interest on the part of the public utilities in the cause of safety. This section, which a few years ago was a minor section now overshadows all other sections and to my mind it is the most constructive good to the cause of safety of any department in the National Safety Council.

I take great pleasure in presenting Mr. R. M. Searle, president, Rochester Gas & Electric Corporation, Rochester, N. Y.

ADDRESS OF MR. R. M. SEARLE

I am fully alive to the fact that if you capitalize accidents from service or lack of service you will have it on what a man would be worth to your company per capita. If you were in a trolley you would be worth \$60 per capita; if you figure what a person is worth to society he is worth \$2,000 a year. And every gravestone in every cemetery that marks an accident victim represents a loss to society of not only the producing power of \$2,000 a year but a loss to human happiness.

To show you how you can overtake your thoughts, I have always been a believer in disposing of a malformed child at birth, and see what a loss it would have been if we had not had Steinmetz. So, see how easy it is to "kid" yourself into letting your ideas of this advanced civilization run away with you? In other words, Steinmetz has contributed to society an untold amount because propaganda for deformed children did not carry out its object.

You are your brother's keeper, and I am my brother's keeper. We can, in accident prevention, make ourselves a brother.

It is largely a case of the Golden Rule. To give you an idea of how discipline will affect treatment of people, about 10 or 12 years ago we had a large steam drum burst and a workman was badly scalded. I saw him and immediately ordered him taken to the hospital. A man came running up to me and said, "If you touch that man you commit a liability."

I said, "Do you mean to say that I have a policy that makes me a——? Cancel it!"

We did cancel it and I organized the Mutual Utility Insurance Company. After five years demonstration we know what we can do. We made a success of it and since that time the insurance people have made a policy that will give a man anything he wants.

Think of a man scalded almost to death lying there and no one can touch him. Of course, you are all liable. You are liable not financially but as a human being for the soul of that man. Imagine hiring the man and having him get burned and then say to him, "You are a damned fool to get scalded."

SAFETY ENGINEERS AS HAZARDS EXPERTS

I have gotten into this game and I feel more satisfaction in this work than any work in the utility business, because I have always been very much interested in the prevention of accidents, and I predict that within the next five years the engineers will be the men who say, "Stop! Put up that guard." "Stop loading that scaffold," etc. He will be the man who has the knowledge of every hazard.

We have a construction job now of approximately \$600,000 and I wandered down there the other day and in 50 seconds I counted 50 hazards. Why shouldn't the public assume one per cent of the capital to save human life, and save suffering? As I said, I counted 50 hazards in 50 seconds. We have to cut down those hazards, and that should be the last cut you make. I would rather stop my work and put up tar and say I have prevented an injury to my fellow-man.

I feel that on every job we should have a professional man who will be an authority on hazards. He will be so thoroughly imbued, so obsessed with the idea that he will foresee what is going to happen.

We fool ourselves here today about jay-walking and reckless driving, and we would be the first ones to object to the roping off of the sidewalks, and every one of us are jay-walkers. Last Monday I was going to cross Fifth Avenue when I saw a lady in an auto coming from one direction, and in stepping back out of her way another car came round the corner and bumped me. I had no business jay-walking. I am not like the fellow who came running out of the Engineer's Club the other evening and was hit by an automobile. He got up from the pavement, felt of his hip, felt something warm running down his leg, and when the policeman came up and inquired whether or not he was hurt, the fellow said, "I don't think I am hurt, but I hope that is blood."

The roping off of the sidewalks will do only so much to prevent jay-walking, but it will cause persons to observe the usual safeguards. I am getting so that I do not consider anything safe any more; everything is a hazard.

Now, the message I want to leave with you is that you have got to attend these meetings of the Council. You get more out of them than any one else. You have got to send the younger man along to be educated, and the boys and girls in the public schools. Teach them that the one who takes a dare is the coward. They have always been taught to think that the one who would not take the dare is the coward, when the reverse is the case. It is a fact that you have got to have courage to say "No."

I had a very dear friend in Indianapolis who was an aviator. One day he went before the grandstand and said that no man could fly in such a high wind. What was the result? He went up against his will and was killed. I would have told the crowd to go to hell.

In the city of New York not so very long ago a young fellow left his wife standing on the pavement while he tried to scale the side of the Martinique Hotel. He fell and was killed, because he was a coward. The people were there in the thousands waiting for something to happen. He did not have the courage to say no. It takes a brave man to say that word, and with that message I want to ask you to come here, attend these meetings and reap the benefit that is to be derived from them. But I do not know of anything greater than prevention of an accident or injury to the family.

OBLIGATIONS AND OPPORTUNITIES OF PUBLIC SERVICE COMPANIES IN COMMUNITY SAFETY

S. RUSSELL BOWEN, VICE-PRESIDENT, WASHINGTON RAILWAY AND ELECTRIC COMPANY, WASHINGTON, D. C.

Public Service companies, whether incorporated under general provisions of law, or by special act of the legislature, are engaged in a service of a quasi-public character, and are, therefore, delegated the right and permitted to occupy streets, roads and highways and construct and maintain underground and overhead lines and other structures, running for a limited or unlimited period of time, for the purpose of furnishing service to the public. The very nature of such business is monopolistic in character. Although the charter or franchise may not, in terms, convey an absolute monopoly to perform a given service in a particular locality, yet in most instances one is practically created, although some competition may be invited from other forms of service; for instance, an electric light company has certain competition to meet where a gas company exists in the same locality, or a street railway may have competition through jitneys, busses and private use of automobiles. A public service company usually is granted certain other extraordinary rights, such as the power to condemn land for proper corporate purposes. In the exercise of these delegated rights it must always be borne in mind that the business of a public utility is "impressed with a public use" and that it may

not be formed for gain alone, although justice requires that such service, when properly performed, should be always fairly compensated and that every utility should be given an adequate return upon the fair present value of the property devoted to the use of the public

Would it be unfair to say that a survey of the past might indicate a failure on the part of the management of some utilities to discern and develop a full appreciation of the obligations resting upon them and due to the public in the operation of such enterprises.

In the early and experimental stages of the industry and when a few men of initiative and genius ventured in new fields of utility service, then particularly calling for operators of constructive ability with tenacity and constancy of purpose to meet and overcome untold obstacles and difficulties, with little promise of reward or return for their labor or money risked therein, it was not opportune to engage in, nor was time given to the consideration of the niceties and refinements of the industry and which should properly prevail.

It was not the custom then to pay a penny for franchise, but they were granted in the aspect of a gratuity, the public authorities then being quite willing to see private capital incur the risk of the venture. The private investor naturally thought his capital would be accorded the protection it deserved.

SACRIFICES OF PUBLIC UTILITIES GO UNREWARDED

As time went on rapid development costs were incurred. If the initial rates of service had been made sufficient to cover them, those rates in most cases would have been excessive and would have retarded the usefulness of the service. Experience demonstrated that the rapid progress of invention and science in the various fields of utility service has constantly developed new and improved plants and equipment. The construction and equipment of railways, for instance, have undergone revolutions from horse car to cable, and from the latter to electric operation, each constituting the abandonment of physical property before it was worn out. In most instances the utilities companies have not been rewarded for this contribution and outlay, some commissions and other regulatory authorities refusing to permit the capitalization of such costs or to allow any return thereon. The public has not lent the encouragement which these sacrifices deserved, and hence the relations between the public and public utilities have not always been harmonious and such as should have obtained for the good of the service. Some misunderstanding and bitterness at times have been engendered with the consequent failure on both sides to obtain the best results.

Unfortunately, the public and some regulatory bodies have not taken, nor do they always entertain, the correct attitude toward public utilities, although the public has been largely benefitted in the construction and maintenance of the same. It was not unnatural, therefore for some operators in the past to become discouraged and look upon public utilities

not unlike industrial concerns. The views generally of operators in this respect has changed in the last few decades and any generation should be held responsible only for conformity to the standards of its time.

The creation of regulatory bodies has done much to take out of politics and remove from local influences the regulation of public utilities. The quasi-judicial procedure before the commissions and the orderly consideration of such questions and the claims of utility corporations and the public, has, generally speaking, resulted for the common good of the public and the utilities. Government in a democracy must depend upon the wisdom and justice of the people and their reverence of the law. The public should entertain a spirit of fair play towards public utilities and be willing to accord to them "a day in court" and always a fair and impartial hearing upon questions in which they are interested.

While some improvement has been made, much can be done to improve relations between the public and public utility corporations. All civic bodies can and should help in standing for fair treatment of all public utilities, and in recognizing that utilities are community builders, and that proper encouragement should be given on the part of the public.

Assuming that the public will do its part, having in view the advantages accruing from a proper conception and discharge of the obligation resting upon all concerned in the furnishing of utility service, we therefore urge that a public service company should have a "soul" and be willing to exercise a controlling influence, such as possessed by individuals, and recognize equally the rights, interests and welfare of itself with all others.

It follows, therefore, that a public utility should recognize its obligations to its employees, whose services are essential to the success of the enterprise. As far as practicable, employees should always be provided with safe tools and appliances, and with safe and healthful working and living conditions, as well as the pay envelope. Friendly relations also should be cultivated and created between a public utility and its employees, for without contented and satisfied employees the service furnished will not really measure up to that standard calculated to please the public—and win general favor.

Likewise, a public utility, and particularly a railway, should recognize that it is engaged in an industry in which public accidents, as distinguished from industrial accidents, commonly occur. Therefore, everything humanly possible, within reasonable bounds, should be done to minimize bodily injury and the loss of life to patrons and the general public.

AVOIDANCE OF ACCIDENTS SUSTAINS PUBLIC FAITH

Having admitted such obligations, what can be done in the matter? A public utility can and should inaugurate a safety department for the instruction of its employees in ways and means to minimize, reduce or avoid accidents, and suitable recognition or reward should be offered to awaken, promote and encourage those employees who need some extra

stimulus to get them out of a "rut" and to more fully appreciate their surroundings and the necessity for self-protection, as well as the protection of the public, of applying principles of safety in all operations.

The public, too, should be invited to assist employees in reduction and avoidance of accidents, for without such co-operation on their part the best results in a Safety movement will not be achieved. The benefits accruing to the public from such co-operation are manifest. Knowledge on the part of the public that a public utility has acted wisely, if not liberally, in the adoption of all measures looking to the prevention of accidents, and in the insistence upon and adherence to safe operating rules for their protection, as well as for the rendition of comfortable and efficient service, will create in patrons a peace of mind and a sense of satisfaction that will bring about a relation on the part of the public ultimately ripening into a good will of inestimable value to the utility. It will, moreover, make it easier to organize public sentiment in favor of measures for the better training and licensing of chauffeurs, the elimination of narrow streets, bad curves and grades, and parking in congested areas.

The public will also become more interested in publicity campaigns for the better instruction of school children and others in Safety principles, and in the adoption of uniform traffic rules, including the promulgation of regulations that will prohibit excessive speed, and that will restrain the reckless operators of motor vehicles and users of the streets and highways.

Proof is hardly necessary to convince public service companies that the Safety movement is justified. The total cost of accidents to electric railway systems of the United States each year is stated to be approximately \$40,000,000, which represents some 4.7 percent of the yearly gross income of the industry. If this annual loss, or a substantial part thereof, could be saved or prevented, it would greatly improve the condition of the street railways.

It is obviously in the interest of the public service companies to avoid controversy, and to maintain peaceable and satisfactory relations with the public. The reduction and elimination of preventable accidents, with the attendant claims for injuries and damages, will largely promote such relations upon the part of the public. Statistics available show that 50 percent of the electric railway accidents are caused by motor vehicles, and the number is constantly growing with the increase of automotive transportation. It may be said that some of the accidents could not have been prevented, no matter how much care had been exercised, but it stands to reason that a large percentage of them could have been if the safety idea had been applied. With such appalling figures the industry must be awakened and constructive work immediately commenced to improve the situation before the accident problem gets beyond control and before public sentiment becomes aroused through such failure with possible drastic and unreasonable legislation as a result thereof.

A public utility should not stop with its own safety work. It has a larger opportunity, that is to say, such a utility has the obligation and opportunity of alignment with safety organizations to better educate the public, furnish statistics on various phases of accident prevention work, and in other ways mould public opinion in favor of all proper measures designed for safety. No utility would think of relying upon fire apparatus, or upon watchmen of its own, for sole protection against fire or violence. How can a public utility reasonably expect to engage in or promote accident prevention work and achieve the best results single-handed, and overcome the suggestion that is sometimes made that such a movement is actuated solely from a pecuniary standpoint? The answer is that every public service corporation should align or associate itself with properly accredited safety organizations and sustain them in the great public work of saving human life and limb, which is incapable of estimation in money, as well as conducting its own Safety Department for safe and efficient operation—all contributing to and making possible rendition of the highest and the best service to the public. Any public service company failing to recognize its obligations in this respect, and whose management deliberately shuts the door of opportunity to assist in community safety, is likened to the man who "hath ears but heareth not."

ADJOURNMENT

Rubber Section

October 3 and 4, 1923

E. W. BECK, Chairman

United States Rubber Company, New York City

C. T. WILSON, Vice-Chairman

Kelly Springfield Tire Company, Cumberland, Md.

A. M. PARTRIDGE, Secretary

Fisk Rubber Company, Chicopee Falls, Mass.

WEDNESDAY MORNING SESSION

CHAIRMAN BECK: I was extremely fortunate in having some splendid co-workers with me during the past year and the success of the section has been due to their hard work. Consequently, they will speak for the work better than the chairman can.

REPORT OF SECRETARY

A. M. PARTRIDGE

An executive committee composed of 12 members, 11 from various rubber concerns and one representing headquarters, National Safety Council, has met on three different occasions—twice at New York City and once at Akron, Ohio. Following these meetings, the secretary has put all matters discussed into *News Letter* forms and they have been mailed to all members of the section, thus keeping them in close touch with the progress of safety work within the industry. That these items were well received has been evinced by favorable replies and requests for certain specific information on subjects mentioned in letters.

Within a year, the membership has increased about 30 per cent. The safety bulletin service has been snappy and up to date and you compare favorably with other sectional bulletins issued. During the year 41 bulletins have been furnished to the National Safety Council, 27 of the cartoon style and 14 photographs. This will leave a surplus for the coming year.

The engineering committee has been getting together a list of hazards to submit to manufacturers with the intention of interesting them to the extent that many unsafe conditions on machines might be eliminated or reduced before they leave the place of manufacture. Much work has

been put in on Safe Practices Pamphlets and when they are complete and ready for distribution will be much sought after, for they will surely be worth while reading and studying.

The safety work in this section has received much stimulus through the wide spread advertising that it has had in the rubber trade journals and through the cooperation of the Rubber Association of America and the National Safety Council. I wish at this time to express the thanks of the executive committee to those members of the National Safety Council, the rubber section and many others outside the industry who by their cooperation and constructive criticism have helped to make such good progress in accident prevention work throughout the past year.

Statistics have been compiled semi-annually and that interest has been aroused is shown by the fact that new companies are now sending in figures and the older ones are furnishing them in a more complete manner.

(Motion made, seconded and carried that the report be adopted as read.)

REPORT OF BULLETIN COMMITTEE

H. H. GRAEF

At the beginning of the year, we had some discussion as to the type of bulletins which gave the greatest value. Some of the members were in favor of bulletins in the form of actual photographs, taken in various parts of the factory and displaying hazards incident to the industries; and others were in favor of bulletins made up in the form of cartoons or sketches which would portray these same hazards.

One group claimed that the photographs displayed more accurately the actual conditions which existed. On the other hand, the other group felt that certain things could be done by the hand of an artist that couldn't be done with a camera. The little hazards which by the camera would appear very unimportant, could be exaggerated by the pen of the artist and made to show up much better. For that reason, they felt bulletins in the form of cartoons had a better effect on the workman and at the same time caught his eye more quickly than the photograph.

After some discussion in the section, we finally decided it wasn't advisable to confine ourselves to either one of these types, but in so far as possible, we would stick to the cartoon type of bulletin. Another reason for this was that most of the bulletins gotten out by the National Safety Council are of the photograph type and the Rubber Section does not confine the use of its bulletins to the Rubber Section alone, but uses those of the other sections also.

THE FUNCTION OF THE SAFETY MAN IN INDUSTRY

CYRUS CHING, SUPERVISOR OF INDUSTRIAL RELATIONS, UNITED STATES RUBBER COMPANY, NEW YORK CITY

In looking at the function of the safety man in industry, it has always seemed to me that the need in that particular phase of industrial activity is the same need that exists in our churches, our political institutions

namely, this one thing: man leadership! That is the crying need in this country today, leadership. It doesn't make any difference whether it is the plant doctor, the engineer, the manager, the foreman, the personnel man, the employment man, or whatnot—what we do need, and must have, is man leadership in all of our industrial activities. It is especially necessary in this work we are engaged in and so interested in.

So far as safety work in plants is concerned, it isn't anything that one receives such a tremendous amount of credit for. There are the spectacular things in connection with safety: you can put on a great safety first week, day or month, you can placard your plant, you can create a tremendous amount of excitement and enthusiasm, but beware of reactions. Those things are all well in their place, but the safety work that counts, is the safety work that is being accomplished day in and day out.

It is a thankless job, in many instances, finding opposition on the part of a good many people. A lot are not interested in it at all. A lot are more interested in some other phase of the factory—management, production—and the safety man has to plug along under those conditions. It is the fellow who has the grit, the ability, the nerve and the leadership that will get there.

The fellow always looking for an opportunity to get in the limelight, the fellow looking for something spectacular and playing it up, is not going to accomplish any more in the safety line than he would in any other line. Spectacular performers get the spotlight for a little while, but some other person blows a whistle and it is turned another way. His corner is left in darkness, and he doesn't accomplish very much.

I wonder as I attend these conventions pertaining to safety and allied matters, conventions of Chambers of Commerce, industrial conventions, how much understanding we have of the other fellow's point of view.

There is this conclusion I have arrived at after 20 years of mixing with men—having worked with men and being graduated from the front end of a street car in Boston; having for eight years negotiated with 16 labor unions—that the viewpoint of the man in the factory or on the railroads is just about the same as the viewpoint of the men in this room. There isn't any mass point of view in regard to any industrial matter. It is a group of individuals. Our whole industrial, our whole political, our whole social success in this country has been up to individual effort, initiative and ability. So there isn't any mass point of view on the part of those below the rank of foreman in a plant, that we can sit down and figure out and then apply the remedy.

ATTITUDE TOWARD THE FOREIGNER

I think it might be well for all of us to stop some time and consider just what our attitude of mind would be, provided we went to Germany, or Italy, or France, or Czecho-Slovakia, and got a job in an industrial plant there being forced to do that because of economic conditions in our own

country. If we had to earn a living among strangers who didn't speak our language, the paramount thing in our minds would be that job, that opportunity to earn a living.

The question of Americanization has a lot to do with the Safety Movement insofar as our foreign-born workers are concerned. I have this very definite idea in regard to that particular problem: if I were in an industrial plant in Italy, trying to work for my living, in a country where everything was foreign to me, and some fellow came in and started to Italianize me a few minutes after I got in the plant, I would resent it.

I think one of the big mistakes in this country is the theory that the first thing we have got to do with a fellow when he lands is to Americanize him. We are in a process of evolution all the time and I believe one of the big problems in the country is to Americanize those who are born here as well as those who were born elsewhere.

I don't believe it is possible for us to carry on a very successful work in Americanizing foreigners, when we as Americans put laws on our statute books and then turn around and violate them, immediately. I believe one of the things in this country—leaving out the question of the Eighteenth Amendment—causing the greatest amount of unrest on the part of the foreign-born, is the absolute disregard and absolute disrespect for governmental institutions. We can't hope to accomplish very much in the way of Americanizing foreigners, except on the basis of example.

Some one will make the statement that the answer to the whole industrial problem is education. Very fine! We take a foreign-born worker from one of our plants, and we establish a school, either within or without the plant, for the purpose of teaching him American ways. After he has gone through a certain period there and is able to read and write English, we then take him up to the naturalization court where he parts with five dollars, holds up his hand and repeats a lot of meaningless words, and becomes a citizen. He goes out on the sidewalk, meets a fellow who says "I wonder who that damn wop is?" There is only one way we can Americanize the foreign-born worker in this country and that is by example. If we are going to consider the United States as a nation and as a family, we can't take people in on the basis of being stepchildren. We have to take them in as part of the family. If we don't want to take our foreign-born people in here on the same basis as the worker born in this country, on the basis of full citizenship, then let's not take them in at all.

I believe if we are going to get the message of safety across especially to the foreign-born worker, we have got to consider that phase of it. We have got to get to our supervisory officials to get a little of the stranger's point of view to establish a confidence on his part, not by absolute rules such as you see. Fire him if you have to, but I don't believe in making threats. That is one of the things I think is getting us into a lot of difficulty: this question of the lack of understanding and the lack of confidence, and whatever a safety man can do, whatever the engineering

department can do, whatever the medical department can do, or the employment department or any other department in the plant, to establish some slight degree of confidence on the part of the man in the institution for which he works, is going to make your safety program very much easier to put across.

THE FIELD FOR SAFETY MEN

I believe there is a tremendous field today for safety men in plants. I feel it is absolutely true in our own plants. If they didn't do another thing for the next six months except concentrate on foremen and assistant foremen, they would have their hands full. How can you expect a fellow who can scarcely speak the English language to be always in a position of performing his work in a safe manner if your foremen and assistant managers by their example, are violating every safety law, each time that they move around? I think one of the big problems facing the safety man today is to get the foreman's confidence, to sell him safety, and to get him absolutely, all the time he is in the plant and out of the plant, thinking in terms of safety and safe practice.

You have got to get the idea all the way up and down the organization. The function of the safety man is very similar to the coach on the sidelines. The team is your lineup in the plant. The coach has to keep his eyes open and be all ready to change signals if things are not going right. A safety man all by himself, trying to carry on a safety work and not having the support all the way up and down the line is not going to put across any program that would be effective.

To my mind safety is service. It is service to the human industry, service to the community, service to the whole human race.

I don't know where the line should be drawn between pushing too hard and putting on the brakes, but there is a place somewhere where you can carry on considerable judicious advertising. One thing I am sure of and that is, you will never get very far on selling safety in your plant on the basis of conversation. If you don't have your statistics ready to show so that you can go in and say, "There is the story; it isn't necessary to talk very much about it," the other man will say, "He has a wonderful line of talk. He almost sold me."

You have got to have your statistics and figures. You have got to know what you are doing. You have got to get figures down so that they can talk for themselves, as a dollars and cents proposition. That is the problem.

As I said in the beginning, the crying need today in this country is leadership. It is man leadership, leadership in the industries, in the communities in which we live. I don't believe we can hope to get very far either in our communities, churches or industries or in our political life until the American citizen wakes up to his responsibility and is willing to assume for all the liberties he enjoys in this country, some of its responsibilities.

PERSONAL ACCIDENT PREVENTION IN THE RUBBER INDUSTRY

WILLIAM E. DATE, CUTLER HAMMER MANUFACTURING COMPANY, CHICAGO, ILL.

Serious personal hazards obtain in the production of rubber products and the solution to the problem that confronts the safety engineer is manifold.

- (1) The first consideration is one of machine design. The endeavor should be toward machines of such basic design that possible causes of accidents are excluded to the maximum.
- (2) The regulation of production operations to reduce possible hazards as far as conditions will permit.
- (3) The education of operators against careless practices and assuming unwarranted chances.
- (4) The selection of safety devices that will provide protection against hazards that cannot be eliminated in the machine design or that neither production program nor education can be depended upon to prevent.
- (5) Accessibility of the safety device to the operator, and speed of response of the device to the operator's impulse.

The object of this Paper is to deal with solutions to (4) and (5).

APPLICATIONS

The various general types of production machinery may be grouped under three general headings.

- (1) Mill lines (crackers, washers, mixers, batch warmers, etc.)
- (2) Calendars.
- (3) Miscellaneous machines.

MILL LINE DRIVES

Mill lines are usually group drive, each equipped with a motor of suitable size to drive all mills on the line loaded. With all mills, or an appreciable number of them, loaded, the mill line friction is high, and a quick stop in event of need is easily effected.

The large problem is one of obtaining a quick, safety stop when the mill line is operating with a light load, or with a small percentage of the mills in actual operation, as the amount of friction in the mill line is then relatively low compared to the high inertia of the rotating parts of the drive. Under this operating condition, the problem we must face is one of stopping the mills quickly to insure against serious injury, or preferably none, to the operator.

The following tabulation, Table 1, based on standard modern type of mill motor at 514 R. P. M. can be considered as typical of the motor conditions that obtain generally on mill lines, and the amount of torque that must be applied to stop the motor within a time equivalent to that which would equal a 6 inch stop on a 22 inch front roll of a mill that is operating at 18 R. P. M.

TABLE 1

Horsepower of Motor	Normal Motor Torque Lb.—Ft.	Torque Required for 6-inch stop Lb.—Ft.	Ratio of Required Torque to Normal Torque
50	510	2,380	4.65
100	1,020	6,200	6.10
200	2,050	10,700	5.20
300	3,070	12,400	4.10
400	4,100	13,500	3.30
500	5,100	15,500	3.00

The tabulation given below under Table 2 accentuates further the problem involved in obtaining a quick stop to the mills.

TABLE 2

Horsepower of Motor	Moment of Inertia	Kinetic Energy in Foot-Pounds	
		In Rotor at 514 R. P. M.	In Couplings, Brake Wheel, Gears, Etc.
50	540	25,000	12,500
100	1,450	65,000	32,500
200	2,500	112,000	56,000
300	2,900	130,000	65,000
400	3,200	144,000	72,000
500	3,600	162,000	81,000

The "moment of inertia," second column, applies to a standard line of mill motors, at 514 R. P. M. and is typical of modern motor practice.

It is based on the formula— $I=W K^2$, where

I is Moment of inertia.

W is Weight of rotor in pounds, and

K is Radius of gyration in feet.

The kinetic energy stored in the rotor given in the third column, is based on the formula $E=17 I N^2$, where

E is Kinetic energy stored in the rotor

I is Moment of inertia from second column, and

N is Revolutions per minute

The kinetic stored energy in the couplings, brake wheel, and gears, Column 4, approximates one-half of that stored in the rotor. This shows that two thirds of the energy to be overcome on stopping is the energy stored in the motor rotor.

For distances of travel on stopping other than 6 inches to the rolls, the torque required will be inversely proportional to that given in the third column of Table I. For example, twice the torque given would be required for a three inch stop, or one-half for a twelve inch stop.

In order to stop a mill line and the motor within a travel of six inches on the periphery of the 22 inch roll, the motor must be stopped within $2\frac{1}{2}$ revolutions, or in about 0.58 seconds.

The foregoing does not take into account the retardation provided by loaded mills. On a four mill drive with one mill normally loaded, it could be considered that this mill would supply a retarding torque equal to one fourth normal motor torque and the brake then would have to provide the difference between this and the total retarding torque required.

Segregation of Rotating Parts. Since our problem is one of stopping the rolls quickly, and we have found that in doing so that our large problem is to stop the motor, it is evident that if we have a convenient means to disconnect the large inertia load (the motor) from the relatively small inertia load (the mills), the problem of stopping the slow moving low inertia rolls should be materially simplified, and herein lies the value of the magnetic clutch-brake.

By interposing a magnetic clutch between the motor and the pinion a convenient means is provided for disconnecting the rotor of the motor mechanically from the mill line thus relieving the brake of two-thirds of the work that it would otherwise be called upon to do, and by mounting the brake on the mill line side of the drive, the mills are stopped quickly and without undue strain on the equipment.

The chart on Figure 1 was compiled from test on an installation of two warming mills while stopping under eight sets of conditions. The measurement was made on the front roll of one of the mills. The test conditions were as follows:

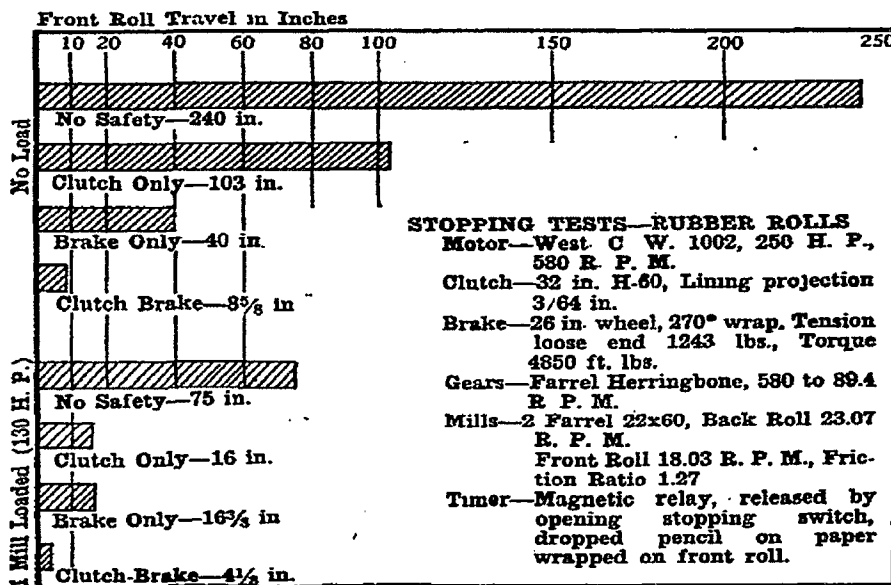


FIG. 1

(1) Both Mills Empty.

- (a) Equipment allowed to drift to standstill.
- (b) Clutch disengaged, allowing mills only, to drift to standstill.
- (c) Brake applied to stop mills, shafting and motor.
- (d) Magnetic clutch de-energized and brake applied to stop mills and shafting only.

(2) One Mill Fully Loaded.

Foregoing tests repeated.

The great difference between the travel in (c) and (d) under (1), and between (c) and (d) under (2), is due to the fact that in (d) and in (2d) the large kinetic energy of the motor load is disconnected from the mill line so that all of the energy of the brake is available for stopping the mill line, which is ample to stop the mill line in one-quarter the time that would be required if the brake must stop the motor also.

Low Voltage Release Protection. In addition to providing ready and effective means for separating the high kinetic energy portion of the drive (the motor) from the low kinetic energy portion (the mills), the magnetic clutch-brake also provides low-voltage protection, in that when installed with suitable accessories, the circuit to its exciting windings cannot be restored through the re-setting of the safety switches, and the mills can only be re-started through the manual resetting of the breaker provided for the purpose. The circuits are also so arranged that the clutch member cannot be excited if the brake is not released.

Any failure of exciting energy applies the safety. No force is depended upon for safety except gravity. This is true low-voltage protection.

The simplicity of the magnetic clutch brake is a large asset, which assures dependability as a safety device.



Fig. 2

Installation Flexibility. The magnetic clutch brake is equally adaptable to either "pit" or "overhead" drives. A typical installation is shown on Fig. 2.

Accessories. In the selection and installation of accessories, four essentials must be kept in the foreground.

1. The accessory and its actuating mechanism must respond quickly to the impulse given by the operator. Any delay at this point adds to the hazard and reduces the value of the safety device as a whole.

2. The actuating device must be installed at such location in respect to the operator that he can reach it readily and quickly, and also so arranged that, irrespective of the direction of travel of the operator's impulse, upward or downward, the mechanism will trip the accessory to apply the safety device. The actuating devices should be designed to harmonize with the type and size of the mills. A safety "cradle," for example, of suitable dimension on a 16" x 16" x 40" mill, would not be an advantageous safety actuating mechanism for a 22" x 22" x 60" mill and would have greater short-comings if applied to a 26" x 22" x 84" mill. It could not be readily reached by the operator. If the reverse situation obtained, namely—the application of a safety cradle designed for a 26" x 22" x 84" mill were applied to a 16" mill, it would extend over the rolls to an objectionable degree and be a nuisance. To be of maximum value toward safety, the safety actuating mechanism for the safety accessory must be designed for its respective size of mill, so that irrespective of the size or type of mill the device will be within easy reach of the operator, and at the same time must not interfere with his production operations.

3. The safety actuating mechanism must not only be sensitive to the impulse of the operator, but must also be secure against disarrangement through vibration. It must not operate and stop the mills unnecessarily.

Any safety device or part of a safety device that causes shut downs spontaneously becomes a nuisance and operators, to avoid the nuisance secure them rigidly with the result that when occasion arises, requiring a safety stop, they cannot operate the device.

4. The electrical accessory (the safety switch) must be of a practicable electrical structure, and in addition must be of a mechanical design, that will cause it to open-circuit quickly in response to a slight impulse from the safety actuating mechanism. It must require only a minimum of effort to actuate it. The electrical connections to be arranged so that reclosing of this switch will not re-establish the circuit to the safety device and that the circuit to

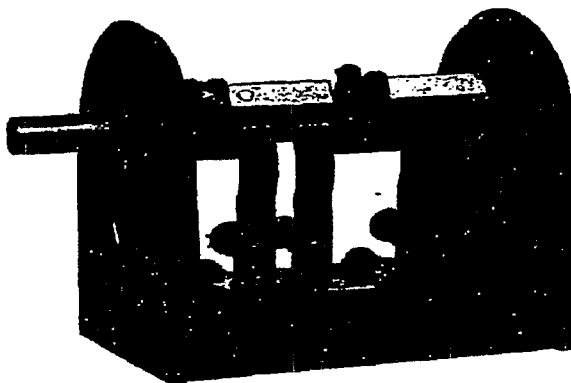


Fig. 2

the safety device will remain open until re-established at the breaker on the starting panel. A conventional form of safety cradle switch is illustrated as Fig. 3. The illustration shows the mechanism with the cover removed.

A typical installation of a "cradle switch" attached to the safety actuating mechanism or "cradle" is pictured in Fig 4.

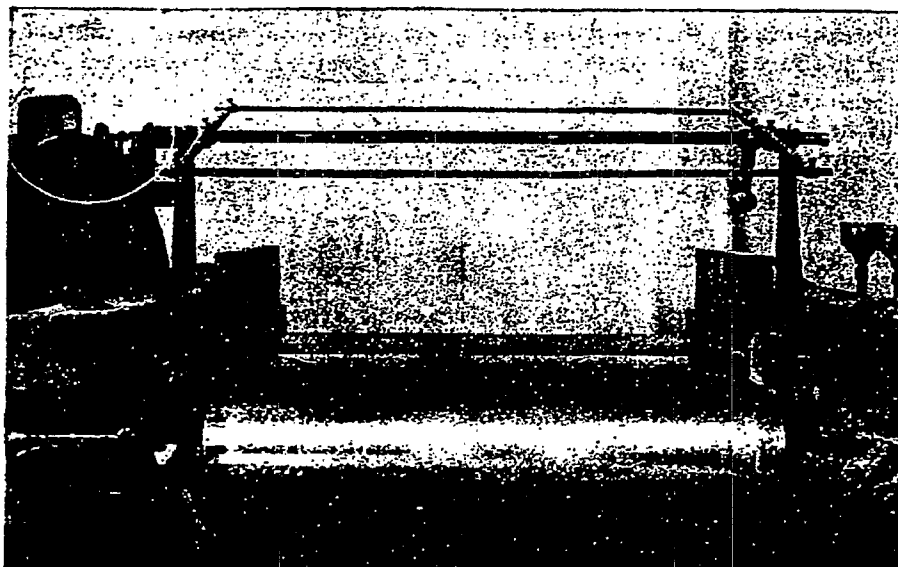


Fig. 4

THE CIRCUIT-BREAKER

1. It provides for true low-voltage protection. In event of failure of the exciting voltage for the clutch brake, the circuit-breaker opens the circuit and prevents re-starting of the mills until the circuit-breaker has been reclosed manually, thus assuring safety against unexpected re-starting.

2. In event that the safety switch on one of the mills has been tripped, the circuit-breaker prevents re-starting of the equipment due to re-closing of the safety switch, until the circuit-breaker has been re-closed manually, again assuring against spontaneous or unexpected re-starting.

3. The circuit-breaker carries the energy for magnetizing the clutch-brake, thereby minimizing the energy capacity requirement of the safety switch, so that it may be of relatively small design without sacrificing dependability. The size of wire requirement to the safety switches is also thereby a minimum.

A typical installation of the circuit-breaker is pictured in Fig. 2. It is noteworthy that the circuit-braker is installed near the motor, and remote from the mills. This method provides against an operator hastily

or thoughtlessly re-closing the circuit-breaker in event of a shut down, giving him ample time to collect his thoughts, and a realization of what he is about to do.

The circuit-breaker panel is equipped with a stop button, so that the circuit-breakers may be tripped from that point also, should occasion require.

COMBINED MOTOR AND CLUTCH-BRAKE CONTROL

In a number of installations, the clutch-brake control has been combined with the control for the motor which drives the respective mill line.

This combination assures a practicable correlation of the control material and therefore provides protection to the motor, to the machinery and to the power supply, and emphasizes the low-voltage protection feature of the magnetic clutch-brake control described earlier in this article.

The salient features of the combination motor and magnetic clutch-brake control are:

1. Enclosed drum type of motor starter interlocked with a low-voltage-protection, overload protection, and clutch-brake panel.
2. Low-voltage-protection to motor, mills and operators.
3. I. T. L. over-load protection to the motor.
4. The clutch-brake circuit is interlocked with the motor starter, so that the clutch-brake cannot be energized unless the motor is running. This assures light duty starting and relieves the supply lines of heavy starting currents.
5. Push button "start" and "stop" of the mill line, for normal stopping and starting, without stopping the motor, and without applying the brake.
6. Emergency stopping from the safety stop switches, opens the magnetic-clutch circuit, applies the brake to the mill line to stop the mills quickly for accident prevention, opens the circuit to the motor and permits the motor to drift to rest. In event of accident all motion is therefore cut off, and re-starting can only be accomplished through the regular channels, namely—
 - (1)—Start the motor, through the means of the motor starter, and
 - (2)—Start the mills, through the push button control of the magnetic clutch-brake.

A careful analysis will show that though the actual stopping time in cases of accident may not be reduced beyond that which obtains through the clutch-brake control only, that this refinement of combination control introduces safety factors that may not be directly apparent. Any group of reciprocal equipment carefully co-ordinated so that each portion must function in its correct sequence will be more simple to operate, hence a safeguard against personal injury, than groups that are not carefully correlated.

The combination motor and magnetic clutch-brake method of control is outlined in the wiring diagram illustrated as Fig. 5.

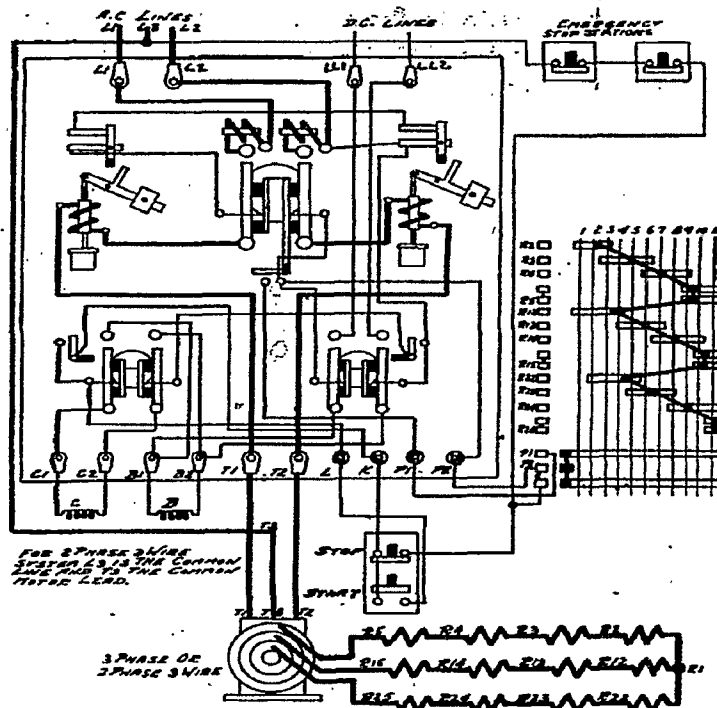


FIG. 5

The switches marked "Emergency Stop Switches" at the top right hand corner represent the safety or cradle switches.

SUMMARY TO SAFETY ON MILL DRIVES

1. Due to the fact that the large kinetic energy of a mill drive is in the motor, and that it is of importance to stop the mills only in event of accident, it follows that the magnetic clutch which disconnects the motor from the mill line mechanically, and the magnetically released brake which applies by gravity to stop the mills quickly, and without undue strain to any portion of the mill drive.
2. That the accessories to the safety device shall be of suitable design, mechanically and electrically, and the electrical connections between the accessories and the safety devices fully correlated.
3. That actuating devices for the safety switch be of suitable design for the mill, and be installed in such manner as to be readily accessible to the impulse of the operator, and quickly responsive to the impulse.
4. That mills be designed as far as practicable to reduce possibility of hazard to a minimum.

CALENDER DRIVES

The problem of protection against serious accidents on the rubber calender is of equal import to the problem of other rubber mill drives and

any differential that may obtain in the selection of safety means is largely due to the nature of the drive rather than to the type of machine.

The following points apply:

- (1)—Design the calender to eliminate possible hazard as far as practicable.
- (2)—Education of operators, particularly against becoming careless as they work with their fingers very close to the bank.
- (3)—Safety switches with suitably designed actuating mechanism and with the actuating mechanism accessibly located. Safety rods both at the bank side and at the back side and also vertical trip cords on each side, connected with horizontal trip cords.
- (4)—The type of motor drive.
- (5)—A reliable, quick stopping safety device on the drive.
- (6)—Convenient means of roll adjustment.

Safety Switches. The safety switches on the safety rods may be of the same type as the safety switch described for the cradles on mixing mills, or they may be of a latched in type. The safety switch for the vertical and horizontal cord should preferably be of the latched in type. The same switches may be used for both the safety rod and for safety cords, though for mechanical simplicity separate switches have a decided advantage.

The selection of suitable safety switches, of location of safety rods and safety cords is of utmost importance. The operator must keep his mind on production and depend on these devices to protect him, and the arrangement must therefore be such that he can reach them and trip them quickly with no mental effort and little physical. They must be accessible, quickly responsive and dependable.

Calender Motor Drives. Calenders as a rule are individual motor drives, and are generally driven by direct current variable speed motors for production economy reasons.

A. C. Constant Speed Drive. If a calender were driven by a constant speed motor the best recommendation for a safety stop device would be a magnetic-clutch brake as on mixing drives.

It is true that the proportion of motor kinetic energy to mill kinetic is lower than on mixing drives, as the motor would be on a basis of single mill capacity, and that a brake only could be used to stop the motor and the calender, but it must not be overlooked that all of the kinetic energy of the rotor must be absorbed by the brake, and through the keys and keyways in the rotor and shaft.

In the isolated instance of a calender always on slow speed work, say at 15 yards per minute, the safety engineer at his discretion could consider the use of a brake only for stopping both the motor and the calender. We, however, could not unqualifiedly recommend a brake only as a safety device on an A. C. Motor driven calender, or in fact on any A. C. motor driven rubber mill machine.

Direct Current Motor Calender Drive. On a calender drive we have as a rule a condition of one motor and one mill. The size of the motor is proportioned to the one mill. We have as a rule some load in the mill acting as a brake. This load may be a relatively light load, or it may be equal to the full rated load of the motor. Nevertheless, under working conditions some friction load obtains. This friction load will be a positive factor toward a quick stop in emergency.

As a rule we have a variable speed direct current motor which, when operating with a full field, or only slightly weakened field, is operating at a relatively slow speed, so that the energy of the revolving rotor varying with MV^2 is relatively low. With this same motor operating at higher speeds, we, on stopping the motor, can utilize the dynamic braking effect of building the field up quickly, which is another positive factor to aid in obtaining a quick stop in emergency.

The kinetic energy of angular rotation of the motor is in the armature of the motor centered at a point fairly close to the motor fields. It is therefore practicable to absorb this kinetic energy of the armature by dynamic braking with no mechanical strains on the motor shaft, keyways, keys or armature spiders. The armature is practically gripped as it were, at the central point of its kinetic energy and brought to rest, the mechanical energy being converted to electrical energy and transmitted through the commutator and brushes and dissipated in the form of heat in the resistor. A direct current motor can be brought to rest quickly by dynamic braking without severe mechanical strain on its structure, and in the instance of a calender the quickness of this stop is limited largely by the mechanical strain imposed on the calender. The calender is a relatively low kinetic energy machine; it as a rule has some friction load upon it, but it must be stopped through shafting, keys, and gears, and as a rule the quickness at which a calender will withstand stopping is the adjusting limit of the dynamic stop.

On a motor drive a mechanical brake absorbs the kinetic energy of the rotor or armature through the mechanical structure of the rotor or armature, keyways, keys and shafting, whereas with the dynamic brake, the kinetic is converted to electrical energy directly at its source, and conducted smoothly to a point remote from the motor for dissipation. The foregoing being true, together with the known performance of a direct current motor with a rapid increase of excitation in its field, and together with a machine that has some friction load, it is evident that dynamic braking can be applied satisfactorily as a safety medium on a rubber calender.

In that the quickest practicable stop is preferred, and in that the quickness of this stop is limited largely by the mechanics of the calender, it is recommended that the dynamic brake apply only as an emergency brake; in other words that the control be arranged for emergency dynamic braking. This means then, for normal stopping from the control push button or speed regulating lever, that the calender be permitted to coast to rest (though a service dynamic could be used if preferred) and to have

the emergency stop only obtain on the tripping of a safety switch. This arrangement provides for a quick stop, as brutal as the calender will stand, for emergency stop, and an easy stop for normal operation.

Empty Calender Hazard. It has been noted frequently that operators in cleaning calender rolls prior to a change in color for the succeeding run, do so with the rolls separated from $\frac{1}{2}$ inch to 2 inches. This is probably due to the laborious work involved with the hand operated roll adjustment. This constitutes a danger hazard. If the rolls were close, the danger would not be great, but the opening as a rule is sufficient to invite an accident. If this were wide, say six inches, or more, the hazard would be eliminated. With a good motor operated roll adjuster it would appear to us that the hazard would be minimized, as the operator would have no inclination to neglect to separate the rolls a safe distance.

MISCELLANEOUS MACHINES—THE TOGGLE PRESS

The toggle press in question is a continuous running machine making a definite number of cycles per hour. A definite length of time is allowed for removing the finished article from the mold and inserting new material before the platen of the press again starts in the upward direction to complete its cycle. It is evident that if the operator is not quick enough in removing the finished article and inserting the raw material for the

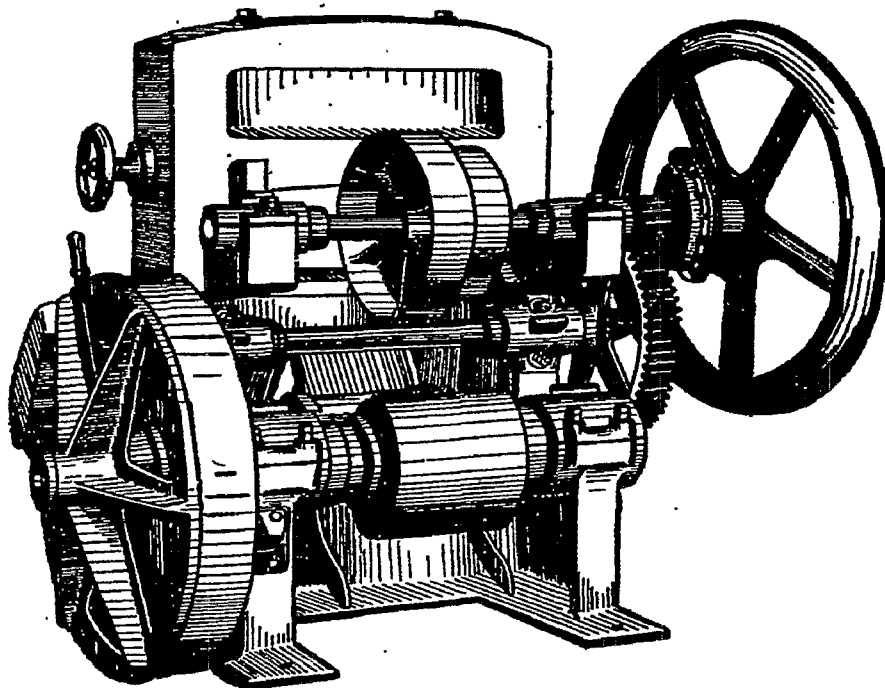


Fig. 6

next one before the platen begins to move upward, he is in very great danger of suffering personal injury by being caught between the platen and the upper head of the press.

To eliminate that hazard, a magnetic clutch is mounted on the driving shaft, which also carries a heavy fly-wheel. One-half of the clutch carries a pinion which drives the press proper, and is bushed on the main driving shaft, to which is keyed the other member of the clutch. By this arrangement, it is unnecessary to stop the motor and fly-wheel to stop the press. All that is necessary is to simply disengage the clutch, whereupon the platen comes to rest almost instantly.

To make the operation of the press absolutely safe, a limit switch of the rotating cam type is directly connected to the driven member of the press. For each cycle of the press, a complete cycle of the limit switch must also take place. On the front of the press, two push buttons are mounted in such a manner that the operator must use one hand to operate each one. The wiring is arranged so that both buttons must be pushed at the same time to engage the clutch. The operator's hands are, therefore, necessarily out of the danger zone.

After the buttons have been depressed, and the clutch engaged, the limit switch maintains the circuit to the clutch and the platen completes its upward stroke.

As soon as it starts on the downward stroke, the operator removes the finished part and inserts the raw material for the next. If he has finished the work before the platen again begins to move upward, he simply holds the push button depressed for an instant until the limit switch has had time to again maintain the clutch circuit. Should he, for some reason, fail to complete that work before the platen has begun its upward stroke, the limit switch automatically dis-engages the clutch and stops the operation of the press since the danger of having his hands caught is eliminated, and he can concentrate his efforts on production.

With the old scheme, which employed a manually operated clutch, the production of the press was limited by a speed which provided a time safety for the operator. By using the magnetic clutch, and automatic quick stop is obtained, the time safety factor is unnecessary and the speed of the press can be increased. Production is limited only by the speed of the operator. If he completes his work of filling the mould before the limit switch stops the platen, he simply depresses the push buttons and the press continues on its next cycle. Should he fail to keep up with the press it will automatically stop at the proper point before there is any danger that he will be caught. Should the power fail, the platen will automatically stop and remain stationary until started again by pushing the two buttons. The magnetic clutch affords absolute safety to the operator.

CONCLUSIONS

1. That personal hazards are present in the rubber industry to as large an extent as in the average producing plant or possibly to a greater degree.

2. That to thoroughly combat the ~~dangerous~~ conditions, the safety engineer has many problems to solve.

3. That a thorough analysis of both the mechanical and electrical conditions surrounding must be made. The characteristics of each type of motor must be studied, and where the kinetic energy of the motor is large, and cannot be absorbed directly, and without subjecting the mechanical parts of the motor to excessive strain it is best to provide means to eliminate it from the braking problem.

4. Where the characteristics of the motor are such that the motor can be used as a braking medium without depending on outside forces such as line energy, it should be made use of. Where outside forces (line energy) would be required to effect a quick stop, it is not safe to depend upon it, as the large demand at that moment is liable to cause a failure of the line supply, and the safety stop would fail.

5. That every safety device must operate on voltage failure, and none be contingent on line voltage supply for safety.

6. That low-voltage-protection be inherent in every control equipment.

7. That every safety actuating device be within easy reach of the operator. That safety devices be reliable, and that they be so arranged that they will not interfere with production through spontaneous operation.

DISCUSSION

Mr. Joseph W. Thropp (Secretary-Treasurer, Wm. R. Thropp Sons' Company, Trenton, N. J.): I believe that every state in the Union should pass a law not allowing any new machinery to be operated without first being passed upon by the Labor Department Inspectors, as to the question of safety appliances. I also believe that the state labor departments should not allow manufacturers to ship machines into their state unless they are fully equipped.

Furthermore, insurance companies should arrange their ratings so the manufacturers, not properly equipped with safety appliances, would be penalized seriously. The insurance companies should test apparatus frequently, to see whether it is properly maintained. In one of the latest industrial compensation rating schedules under rubber mills, they specify the stop of rubber mills to be instantaneous. To me this means nothing, as it is impossible to stop any piece of machinery instantly.

The first point that I will take up, is the question of Safety Stops on rubber mills and calenders, at the point of operation which is the most serious of all. In all our designing we design with the following in mind: when both hands are caught between the rolls, some portion of the operator's body must operate a bar, lever, or rope to stop within a limited distance of the surface travel of the rolls.

LOCATION OF SAFETY TRIP, BARS AND LEVERS FOR RUBBER MILLS

Safety trip bars should be provided front and back of all rubber mills to operate up and down, and should be the full length of the rolls. The levers to be constructed so that you can regulate the front bar higher than the back, or the back bar higher than the front, to suit the class of work

and also the height of the operator. Normal position of the safety trip bar over the front roll shall be five to seven in. from the edge of the front roll, and when in its normal position shall be 22 in. from the top of the front roll with the provision made for adjustment whether up or down, of 3½ in. up or down, but in normal position to be horizontal with the front bar in normal position. There shall be no bar in the center between the rolls.

SEE THIS RELEASE



This is the bar form of trip release. Slight pressure by the operator with his head will release the clutch, stopping the rollers within a short traveling distance.

Safety trip bars shall be provided at front and back of all rubber calenders to operate in a horizontal plane by a push or a pull, and shall be carried the full length of the rolls. The safety bar on the back or feed side shall operate just above the guide and not over 72 in. above the floor which the operator works on. On the opposite side of the calender, the threading side, the bar should be the same height as the center between the top and center roll, and not to exceed 72 in. above the floor. Both sides, the back side and the threading side, should be provided with cables connected to the safety mechanism and shall be not less than one in. from the side of the frame at a distance of not more than 12 in. from the face of the roll, and to run within 6 in. of the floor.

In my opinion, gravity applied brakes are the best for all classes of safety first. For instance, we will take the railroad signals which have been changed in the recent years to gravity application so if in any case the mechanism should fail the signal is at once thrown on.

SAFETY STOPS

For individual motor driven mills and group driven mills with motors up to 200 H. P., and A. C. current calenders, we use our mechanical and electrical patented safety stop which operates as follows:

The overhead levers and bar controls operate a small switch which is in series with the undervoltage release on the motor, and we have it so timed, that after the circuit has been opened a separate rod or cable control trips and drops a lever with weights on—that applies a brake for stopping the momentum.

In addition to this, we have a small switch that is connected to the lever on the hand reset brake, that applies the weight. This switch is in series with the undervoltage release, so when the brake is set it is impossible to start the motor.

For large mill lines, group drives and engine drives, we have a patented differential electric clutch brake, of a heavy low speed type. The principal of this clutch brake is as follows: A steel bull gear is keyed to a drive

CABLE RELEASE



This is a hand cable release. The cable may be reached easily by the operator.

shaft, and a heavy case revolves around the drive shaft with a gear in the center, and a series of specially treated steel pinions around the periphery of this gear. Inside the heavy case the gears are running in oil. The case on one side is equipped with a set of brass collector rings, feeding the current through two brushes—through the collector rings, to each magnet and the magnets are wired in parallel, so in case one magnet goes out, the others will still be operating. At the opposite end of the case is a flange coupling that bolts against a half coupling on the driven shaft.

I believe the best place to put the clutch brake is always at the low speed shaft.

Individual motor driven rubber mills up to and including 16 in. diameter rolls, we equip with our mechanical and electrical safety stop, which has been described, and will stop these in not more than six in. of the periphery of the front roll.

The mills with rolls of 18 in. diameter will stop in a distance of 9 in.; and the rolls of 20 and 22 diameter will stop in 12 in.

Sixteen in. diameter rolls will stop in nine in.; 18 in. diameter rolls will stop in 13½ in., and the 20 and 22 in. diameter rolls will stop in 18 inches.

For stopping limits for individual motor driven calenders, with A. C. current calenders we use either a reset brake or electric solenoid brake and at 30 ft. per minute we stop in two in.; 60 ft. per minute in five in.; 60 to 120 ft. per minute in 15 in.

On Direct Current Motor Driven Calenders; 30 ft. per minute will stop in two in.; 30 to 60 ft. per minute in six in.; 60 to 120 ft. per minute in 18 in.

One of the most important guarding features is the question of guarding the roll neck gears, and in this case I still consider efficiency with safety, by putting an oil pan under the gears and a tight guard over them, with two thimbles with fly nuts over stuffing boxes, which can be easily removed and entirely guards the stuffing boxes, and gears so you can run them in oil. Owing to the space between the machines it is very necessary that the gears and stuffing boxes be properly guarded.

Furthermore, in reference to gear guarding, I would recommend using perforated metal not less than 18 gauge for this class of work, and exceptionally well braced guards.

PLUGGING CONTROLLERS

Mr. C. W. Drake (General Engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.): I concur with what Mr. Date and the other gentlemen have said regarding the characteristics of the motors, that is, the greater part of the flywheel effect is in the motor and it certainly is desirable, if possible, to disconnect the motor and brake the rest of it.

I believe Mr. Davidson mentioned that in the smaller sizes, it is entirely satisfactory to use magnetic brakes. That has been our practice. In the larger sizes, since we do not make clutch brakes, we have been experimenting with plugging controllers. I know you have various views on this subject. With 400 or 500 h.p., direct to the mill line, you don't

need a clutch for braking. Mr. Date indicated that you have to start the motor first. If the motor will start the load, it saves wear on the clutch. With the plugging control it is possible to eliminate the clutch. Then, in case of emergency, plug the motor to a stop. This, we must acknowledge, requires a line voltage. Some people imagine it requires a large amount to start a motor. You can't carry peak loads when braking down; the current at no time exceeds 100 per cent over the load when plugging. The motor must be running at full speed to have an accident. The chance of the power going off in half a second is so remote that any insurance company is willing to take such a chance.

By this method of plugging control, it has been found possible to stop the mills in the same time as with the clutch and much quicker than with a clutch that is not in good condition. Our own brakes require a certain maintenance. Any clutch has to have maintenance or you don't get the same degree of stopping. Electric braking is always the same.

Consequently, we have been experimenting and conducting tests. Customers who have this system installed have spoken very highly of it, and the uniformity and safety which have resulted.

Mr. Congdon: New Jersey differs from the other states in that we do not wait to be shown; we go at it ourselves. As an example, Mr. Leveridge of the State Department some time ago made a tentative regulation regarding the stopping of mills and calenders.

When Mr. Leveridge brought up these points, we immediately began to get busy and do some work on these facts. There are quite a few points to consider. One is the individually driven mill and the other is the group driven mill and the individual calender and the group. The time of the long unit driven by an engine is past and we have now got to the motor driven units, with the higher sizes and speeds.

The first point to consider is the method of obtaining this stopping distance. There are two means which may be used: one is the mechanical and the other, electrical, for measuring this distance. We have made a good many with the pencil which is operated through the solenoid and the electric switch on the mill, acting simultaneously with the tripping of the clutch brake. We can obtain almost any quick stop desired. The controlling factor particularly in mills seems to be the shock on the equipment and the bearings on the shafting.

The conditions are different when the mill is empty. With the mills empty and the clutch brake on, the whole effect of stopping comes on the bands. With the mills filled with stock, there is more or less of a cushion effect along the lengths of line which makes the stop quicker and easier on the equipment.

On the calenders, as most calenders are D. C., we run the motors at various speeds, possibly from 10 yards a minute to 40 yards. From our tests, the distance stopped seems to follow the formula. In other words, plotting a curve of stops of different speeds, (so that the theoretical is very close to the practical), the distance obtained on the individual motor

driven mills of small size and slow speed, we can come down to a very quick stop without much trouble, but it seems as though the particular point of most interest is the long distance travel on the higher speeds and larger sizes.

NEW JERSEY REGULATIONS

Mr. Leveridge (Chief, Bureau of Electrical and Electrical Equipment, Department of Labor of the State of New Jersey): I am more or less responsible for some of the activities in connection with the standardization of safety devices in the rubber industry. What Mr. Thropp and the representative of the Farrell Company has said, testifies to the effectiveness of some of the rules which we have already placed in effect in New Jersey. When we arbitrarily set the stopping distance at six inches as stated, we ran up against a number of difficulties in connection with some of the forms of drives which clearly indicated it wouldn't be possible to accomplish that result. However, after cleaning up quite a number of the mills in that territory in what could be considered a satisfactory manner, I thought it would be desirable to get the opinions and the help of those who are directly associated with the manufacturer of the machines and those directly concerned with the use of them.

I asked Mr. Congdon if he would act as chairman of the committee to undertake the preparation of what might be termed standards and what we hoped to obtain in New Jersey, which he has done very graciously. On that committee, we have the principal manufacturers in Jersey, the Farrell, the Thropp and one of two other manufacturers who have already as stated here, produced equipment in accordance with the suggestions that we previously made, and are getting good results. But there is a point that has come up that is mighty difficult to handle, that is, the actual stopping distance for the various types of drives. In this tentative draft of the code which I will read, we have attempted to set certain limits for the various forms of drives. I am not altogether satisfied that these limits are not too wide. I am going to ask if it will be possible for the Engineering Section or the Rubber Section, whichever it is that takes the action, to conduct tests to assist us in this matter. We all know the American Engineering Standards Committee are preparing codes for universal adoption in all of the states. That brings up the point Mr. Thropp made in his discussion that it would be a fine thing for each stop to be standardized.

That is the purpose of this code. We can hand it to our inspectors so that they will know it complies with the regulations. It will also act as a guide to the producer of the equipment. He will know, through this means, that he cannot ship sub-standard apparatus in that territory.

The root of the trouble is the producer of the machinery. If he doesn't turn out standard equipment that is safe, the supervising authority has a great deal of difficulty in bringing that result about.

NEW JERSEY SAFETY CODE

The code, as tentatively shaped, reads as follows:

SECTION 10.—GENERAL

100. *Scope*—These requirements apply to all machines used in the rubber industry having in-running rolls, whether of the mill or calender type.

101. *Purpose*—The purpose of this code is to provide reasonable safety for life, limb and health. In cases of practical difficulty or unnecessary hardship, the enforcing officers or body (here may be inserted the name of the enforcing officer or body in substitution for the previous four words) may grant exceptions from the literal requirements of this code. The enforcing officers or body may also permit the use of other devices or methods, but only when it is clearly evident that equivalent protection is thereby secured.

102. *Other Codes*—For other rules applying to rubber working plants, which include power transmission hazards, lighting, walkway surfaces, boiler inspection, electric power control, see codes relating to these hazards published or to be published by the American Engineering Standards Committee, 29 W. 39th St., New York City, or the supervising authority having jurisdiction.

103. The word "shall" is to be understood as mandatory and the word "should" as advisory.

104. The word "approved" means approved by the authority having jurisdiction.

105. *New Installations*—On and after (Date) all new installations shall be in full conformity with the intent of this code.

106. *Existing Installations*—All existing installations within a period of two years from (Date) shall be made to conform to these rules as nearly as practicable.

SECTION 11.—LOCATION AND STANDARD HEIGHTS OF MACHINE.

110. *Work Space and Aisles*—Mills and calenders shall be so located as to give (a) enough clearance between machines so that the movement of one operator will not interfere with the work of another; (b) ample room for cleaning machines and handling the work, including material and scrap; (c) aisles of sufficient width to permit the free movement of employees bringing and removing material.

111. *Mill Roll Height*—All mills should be installed so that the top of the front roll is at least 46 inches above the floor upon which operator stands irrespective of the size of the mill.

SECTION 12.—LOCATION OF SAFETY TRIP BARS AND CABLE CONTROLS (Mills and Calenders)

120. *Rubber Mills—Safety Trip Bars*—Safety trip bars shall be provided front and back of all rubber mills to operate either up or down and shall be carried the full length of the rolls.

(a) The normal location of the safety trip bar over the front roll shall be 2 in. to 4 in. from the edge of the front roll and when in its normal position shall be 21 in. from the top of the front roll, with provision made for adjustment either up or down of 3 in. in each direction.

(b) The normal location of the safety trip bar over the back roll shall be in the same horizontal plane as the safety trip bar over the front roll and the length of the lever from the fulcrum shall be the same; the fulcrum shall be located over the bite of the rolls when the rolls are together.

(c) The fixed rod sometimes used for construction purposes running the length of the roll shall be omitted.

121. *Rubber Calenders—Safety Trip Bars and Cables*—Safety trip bars shall be provided front and back of all rubber calenders to operate in a horizontal plane by a push and a pull, and shall be carried the full length of the rolls. Each safety trip bar shall have two safety trip cables, one at each end of the bar, and carried to within 6 in. of the floor. Safety trip cables shall be connected with the trip bar mechanism.

(a) Safety trip bars on each calender shall be at a height not in excess of 72 in. above the floor on which the operator stands and shall be in a line with the outside of the calender frame.

(b) Safety trip cables shall be placed on each side of the calender, one near each end of the rolls, each cable connected to the trip bar mechanism, and shall be positioned at a distance of not more than 12 in. from the face of the roll and at a distance of not less than 1 in. from calender frame. These cables shall be carried to within 6 in. of the floor and effectively secured to the frame of the calender.

SECTION 13.—QUICK STOPPING OF MILLS AND CALENDERS.

(Braking Facilities.)

130. *Stopping Limits*—Individually Driven Rubber Mills. Every mill up to and including 16 in. diameter rolls, running empty at any speed, shall be stopped within a distance of not more than 9 in. measured on the periphery of the front roll simultaneously with the operation of the trip.

Every mill having more than 16 in. diameter rolls, up to and including mills having 24 in. diameter rolls, running empty at any speed, shall be stopped within a distance of not more than 12 in. measured on the periphery of the front roll simultaneously with the operation of the trip.

131. *Stopping Limits*—Group driven mills. Group driven mills up to and including 16 in. diameter rolls, running empty at any speed, shall be stopped within a distance of not more than 12 in. measured on the periphery of the front roll simultaneously with the operation of the trip.

Group driven mills having more than 16 in. diameter rolls, up to and including mills having 24 in. diameter rolls, running empty at any speed, shall be stopped within a distance of not more than 18 in. measured on the periphery of the front roll simultaneously with the operation of the trip.

132. *Stopping Limits*—Individually or group driven calendars. Every calendar of any size of rolls when running empty shall be stopped within the following limits with the distances measured on the periphery of the drive roll simultaneously with the operation of the trip:

(a) Calenders, the drive roll of which travels at not more than 30 ft. per minute, shall be stopped within a distance of not more than three in.

(b) Calenders, the drive roll of which travels over 30 ft. and not more than 60 ft. per minute, shall be stopped within a distance of not more than six in.

(c) Calenders, the drive roll of which travels over 60 ft. and not more than 120 ft. per minute, shall be stopped within a distance of not more than 24 in.

SECTION 14.—ISOLATION OF "POINT OF OPERATION" HAZARD. (Bite.)

140. *Housed-in Bite*—(Mills or Calenders.) When the bite of the rolls on mills or calenders is fully housed in so that operator cannot reach through, over, under or around and come in contact with bite, as in special processes, such as trough-fed mills with trough screened against entry of a human body member, then the following rules apply:

(a) Clutches, cut-off couplings, clutch pulleys, tight and loose pulleys, or equivalent means shall be provided for every mill or calender on or immediately adjacent to such machine.

(b) Fully enclosed automatic mixing machines shall be provided with an interlocking mechanism between the cover through which the material is fed and the stopping and starting mechanism, so arranged that when the cover is open the machine cannot be started and so that when the machine is running the cover cannot be opened.

REPORT OF ENGINEERING COMMITTEE

C. B. MITCHELL, CHAIRMAN

The accompanying treatises on Safeguards for Vulcanizers, Mills and Calenders, if approved, are to be the beginning of what will expand eventually into a complete volume on Safeguards for Rubber Manufacturing Equipment.

The original thought and request of the executive committee was to establish a standardization of safeguards for each class of equipment. Upon starting preliminary studies, it soon became apparent that an understanding must be had on the word "standardization," i. e., whether we should agree to standardize the construction of safeguards, or standardize on generalities and results to be strived for.

Requests were made of various rubber and machinery manufacturers for opinions and it was unanimously urged that no attempt should be made to recommend a definite type of construction and fittings, nor dimensions controlling location of various parts, for this would make it difficult to introduce improvements over an adopted type, and, as one engineer ex-

pressed himself, "no one would care to give the subject of improvement much thought if he felt he would have to sell his idea to State Officials and forty-seven Safety Directors."

Therefore, rather than stifle the proper incentive to develop something better, procedure has been along the line of making explicit and definite the results to be attained, with numerous suggestions for installation and operation, which ought to allow the user and manufacturer sufficient latitude to meet requirements.

To atone somewhat for omitting recommendation of dimensioned devices and maximum and minimum requirements, reference has been made to another published article which describes in detail some of the prevailing safeguards.

Attention is also drawn to the suggestions for operation of equipment, educating workmen to know their job, provisions for eliminating hazards surrounding the equipment, and protecting health, all of which have a distinct bearing on safety of workmen, and make the discussion of each type of equipment complete in itself.

PART I—VULCANIZERS

The vulcanizer, or heater as it is commonly known, is a vessel containing steam under pressure and is used for vulcanizing or curing rubber. The vulcanizers discussed under this heading are those having cylindrical bodies or shells of boiler plate with one end open and cast flanged rings to support the door.

Perhaps the majority of vulcanizers are those of the horizontal type with hinged door, although vertical tire press vulcanizers, in which there is combined steam and hydraulic pressure, are becoming numerous. Pot heaters, three or four feet high are also in use. These types of vulcanizers are almost entirely used with steam within the cylinder shell in direct contact with the rubber being cured.

However, there are a few dry heat vulcanizers in which there is a cylindrical shell within another shell, the space between the two being filled with steam which heats the air within the inner cylinder where the rubber goods are placed.

The various hazards around vulcanizers may be listed as follows: (1) scalds by hot water or steam; (2) burns by hot metal parts; (3) bruises and lacerations by handling doors and materials in vulcanizers; (4) doors blown open by internal pressure because of improper, inadequate and defective door fastenings; (5) rupture and explosions of vulcanizers (the most serious of all.)

DESIGN AND SPECIFICATIONS

1. Steel plate shell, head and flange plates should be of Open-Hearth flange steel or Open-Hearth fire box steel, having an ultimate tensile strength of from 55,000 to 65,000 pounds per square inch. Open-Hearth flange steel predominates in heaters now in use. Open-Hearth fire box steel is not essential, and is mentioned here as a suitable substitute.

2. Rivets should be of boiler rivet steel with an ultimate tensile strength of from 45,000 to 55,000 pounds per square inch.

3. Flange door rings should be of cast steel, meeting the specifications of the A. S. M. E. Boiler Code for Class "B" Steel. Castings soft grade.

4. Cast iron should not be used in the door rings or any other part under tension.

5. Longitudinal seams should be of butt-strap type.

6. In designing vulcanizers where cold water flushing will be done in hot vulcanizers, ample allowance should be made for the sudden contraction stresses and consequent crystallization of the metals. It is usual to allow at least 1/16 in. extra thickness of steel plate in cylinder to allow for corrosion.

7. Vulcanizers should have no less a factor of safety than five.

8. Bolted doors ought not be specified. There are several good types of "quick-opening" doors which carry the load equally distributed over the entire circumference. Preference should be given a type of door whose fastening or locking arrangement is in full sight of operators. On a hinged door, it is well to provide a handle for pulling door open, and means for supporting the open door so that undue twisting stresses will not be placed upon the vulcanizer shell. Oftentimes a roller or wheel can be placed under door, rolling on track on the floor.

9. In designing a vessel, consideration should be given to the manner in which the vessel can be delivered to its destination and installed, whether in a completed or knockdown state, considering what doorways, areaways and elevators it may be possible to use. Where it is necessary to deliver a vessel in a knock-down state, drawings should show such construction, so that the vessel will be made in a manner for knock-down delivery. The same should apply to heater cars, which may be used in a vessel.

MANHOLE DATA

10. The following manhole data is submitted for consideration of those who may design a vulcanizer:

Vessels 24 in. in diameter and 15 ft. or longer in length having a door or suitable manhole at the back end of the vessel.

Vessels 30 in. in diameter and 20 ft. or longer in length having a manhole in the back head.

Vessels 36 in. in diameter and 25 ft. or longer in length having a manhole in the back head.

All manholes shall conform to A. S. M. E. Boiler Code and shall be approximately 11 in. by 15 in. in size, or the equivalent of same. The purpose of this opening at rear of vessel is to make it more accessible for inspection, cleaning and repairs.

11. In general, materials, riveted joints, valves, pipe connections, thicknesses, methods, etc., should follow the Boiler Code specifications.

12. For vulcanizers of small sizes and special uses, such as for experimental work in laboratories, it may be necessary to depart somewhat from the usual specifications. Then the designs should give special consideration to safety and to the uses for which intended.

13. Design all parts so that inspection can be easily made during operation of heater.

14. A large fan suction exhaust controlled by a gate valve at the rear top of horizontal vulcanizer will exhaust fumes and heat. This is especially effective after the door is opened and there is an inrush of air into the front of heater carrying fumes and heat away from workmen.

FITTINGS

1. A safety pop valve is the most important fitting to insure safety and every vulcanizer should be provided with one of ample size to relieve excess pressure quickly. Consult manufacturer to determine capacity.

2. A reducing valve is necessary to reduce the steam pressure to that required in the vulcanizer.

3. A steam gage and thermometer of first class quality are necessary for the operators to check the steam pressure being maintained.

4. A steam trap for removing condensed steam from the vulcanizer must be one which will not become inoperative by soap-stone or sediment which may flow from the bottom of the vulcanizer.

5. The blow off valve should be preferably globe type.

6. On a horizontal vulcanizer, a bleeder valve should be provided near front for draining condensate or cooling water from heater so that when door is opened workmen will not be scalded.

7. Provide a pressure relief valve to insure a complete exhaust of internal pressure before door is opened. This preferably would be so arranged that the door would be locked and could not be opened while there is the least pressure in the vessel, or so that a slight movement in unlocking a "quick-opening" door would fully open relief valve and entirely relieve pressure before door could be completely unlocked.

8. Provide the very best globe and gate valves, which will be least affected by wear of disc and seat.

CONSTRUCTION

1. Drifting of rivet holes for alignment should not be done.

2. Rivets should be driven under hydraulic pressure and allowed to cool while under pressure.

3. After machining, the lugs on door and ring should be given five medium hard blows with a one pound machinist's hammer, using the pole end of hammer and gripping handle at about 15 in. away from hammer head. Blows should not be struck at the same spot, but should be taken at different points, the full length of lug. Door and ring should then be checked over to see that the lugs are not sprung.

4. Sheet steel heads should be formed to a radius not greater than the diameter of the cylinder with concave side to the pressure, and the corner radius of the flanges designed to the A. S. M. E. Boiler Code requirements.

5. Openings—All screwed flanges should be of forged steel. Where a nozzle is required instead of a screwed flange, such nozzle should be either cast steel or forged steel.

6. For vessels of the double-jacketed type, these rules should apply to the general construction. Staybolts should be in size and spacing as specified by the A. S. M. E. regulations.

7. The entire collapsing load in the inner shell of vessels over 40 in. in diameter should be supported by staybolts. Thickness of shells and heads should not be less than $\frac{3}{8}$ in. With this construction, lap joints and single riveted seams should be adequate for inner shell but single butt riveted seams are best in outer shell in staybolted section.

8. The minimum steam space between the shells and heads should be 3 in. Handholes, perhaps four, should be placed around the circumference of the outside rear head in line with the 3 in. steam space between shells for inspection of the rear inside head; also handholes on top and bottom of shell, near each end, for flushing and cleaning of jackets.

9. When the size of an opening in shell is greater than 6 in. in diameter, a flanged nozzle connection riveted securely to the shell should be used.

10. Whenever a screwed pipe connection is used, full length of threads should be used to secure the pipe.

11. When the thickness of the plate in the shell is such as to give the required length of thread for the size of pipe used, the pipe may be screwed in so that the end will come flush with the inside of the shell, but in no case should the end of pipe extend through and beyond the inside of the shell.

12. Butt-straps should be caulked. Caulking inside straps will assist to prevent corrosion between shell and strap.

13. Welding should not be done where the strength of the structure is dependent upon the weld, nor where the load to which the structure is subjected is not carried by other construction, nor in any part of a vulcanizer wholly in tension while under working conditions. Welding of cracks or seams either by the autogenous process or the electric arc in the shell or tension parts may be done for the purpose of securing tightness if the stresses on the parts are fully cared for by properly riveted steps or plates.

14. Progress of the work ought to be followed in shop by a qualified inspector with authority to reject defective materials and workmanship.

15. The completed vulcanizer should be given a final test with a hydrostatic pressure 50 per cent greater than the working pressure to be carried in operation.

16. Stamp or stencil the allowable internal pressure in a place where it can always be observed during operation; also date of manufacture and maker.

INSTALLATION

1. Handle and move vulcanizer carefully and do not cause unnecessary stresses on joints.

2. If heater is installed on an upper floor be positive that floor construction is strong enough to carry full load, especially the load incurred by making a hydrostatic test.

3. Horizontal heaters should set on saddles having rollers to allow freedom for linear expansion and contraction. The one saddle under front of heater may be rigidly fastened to heater. A saddle under each car track support should be provided so that the heater shell does not bear the load of the car between saddles.

4. Install horizontal heaters on a slope of about 1 in. in 30 ft., to drain toward front where steam trap and bleeder valve should be located. There should be thorough drainage, leaving no pockets for corrosion. Heaters over 25 ft. long should have two drains, one near front and the other at middle of length.

5. Vessels should be set high enough above the floor to permit the piping, traps, etc., to the vessel to be on the same floor as the vessel instead of underneath the floor.

6. Safety pop valve, steam gage and thermometer are preferably located near or at top of heater at front. The two latter must be within clear vision of operator. Place reducing valve between safety valve and steam supply connection to main. Safety pop valve should be as large in area as the steam feed line to the heater, and guarded to prevent unauthorized altering for greater pressure.

7. No fitting should be placed so near the front of heater that operation of door may cause damage to it.

8. The blow-off valve should be located in bottom of heater. Where a group of heaters are connected to one blow-off main it may be best to place a check valve between blow-off valve and main with the check in a vertical position. This will prevent blow-off from any other heater entering the heater which is open. Exception may be made in location of blow-off valve in heaters where water cures are used, in which case, valve may be above water line.

9. Provide a tell-tale valve or cock to be opened before door is opened to insure there being no pressure in the heater.

10. Tell-tale, safety pop and relief valves should not be located to blow on workmen.

11. A connection should be provided near steam gage for attaching inspector's test gage.

12. Provide means for opening and closing heavy doors easily. A "quick-opening" hinged door is, perhaps, most easily and safely handled.

13. Doors lifted by hoists should be locked automatically in hoisted position so that rupture of hoist will not allow door to drop.

14. Hot pipes and surfaces should be protected so workmen will not be burned.

15. Provide stops so cars will not roll against end heads of heater or roll out of heater when door is opened.

16. Track bridge from floor to heater must be placed rigidly so as not to be dislodged or spread when car travels over it. It is a good idea to counter-balance the bridge so that lifting of full weight is not necessary, and bridge cannot be placed promiscuously for workmen to stumble over.

17. On "quick-opening" doors it is well to paint the lug rings a bright color so when door is closed it forms a complete painted circle and if operator does not close door completely there will be a break in this circle which can be observed easily.

18. Safety chains are sometimes used to hold door to heater until each door is opened and it is known that there is no pressure in vessel.

19. Before applying asbestos covering, and before putting in service, heater should be painted inside and out with heat and fume resisting paint and be allowed to dry thoroughly.

20. The asbestos covering should clear the connections and pads to allow the connections to be inspected and permit repairs to piping without disturbing the covering.

21. Each vulcanizer should be numbered and always known thereafter by that number.

22. Finally, when the vessel is completed and ready for service, it should be given a final inspection to see that it is connected up properly, and the safety valve set for the proper pressure, before turning the vessel over to the production department.

OPERATION

1. Utmost care should be taken to have door of heater tightly shut.

2. On bolted doors, tighten all bolts equally with a wrench of suitable length to do the work properly without injury to bolts by over-stressing which is often done by use of pipes on wrenches. Bolts should all be tightened with the same tension and only enough to maintain a tight joint under working pressure. In tightening bolts take those which are diametrically across the vessel from each other and then take intermediate bolts diametrically across from each other so as not to tighten adjacent bolts around the circumference.

3. Operators should be thoroughly informed of the dangers in connection with the pressure of steam. Bolted doors have sometimes blown off because of a few bolts omitted or not tightened, allowing all the load to be carried by a few bolts.

4. "Quick-opening" doors with locking lugs should be closed entirely and not allow a portion of each lug to carry all the load.

5. In handling the doors take care not to be pinched between door and heater, equipment or building.

6. When in hoisted position be sure door is locked so that it cannot drop, even if hoist fails.

7. Severe burns can be received from hot doors, especially on bare arms.

8. Doors should not be opened until it is certain that there is no pressure within heater. Make sure that relief valve, blow-off valve and bleeder valves are fully opened and that no hot water lies within heater to run out on workmen when door is opened.

9. When turning steam into heater and bringing up pressure, it is usual to admit steam through a valve in a by-pass around the reducing valve. This raises the pressure and temperatures most quickly and the operator must be trained to observe the thermometer and steam gage very attentively so that pressure may be turned off when up to a limited point, after which steam is admitted through the reducing valve only. The dangers of this method must be fully realized, for, if the steam main pressure is considerably greater than the safe working pressure of the heater and workmen allow this full pressure to be exerted on heater, there may be an explosion. Sometimes during this feed period the thermometer and steam gage will not indicate identically, the temperature being lower than the gage would indicate. This is due to air pockets inside the heater which prevent heater being entirely filled with steam. Extra cocks are often provided at proper points to allow escape of air.

10. See that the by-pass valve is closed tightly and no leakage occurs through it into heater during vulcanizing period.

11. Closely observe thermometer and steam gage during time of cure so there is no opportunity for serious increase of pressure if safety valve should not operate. The thermometer will probably be the most accurate and sensitive for determining the pressure after heater has been completely filled with steam.

12. The safety valve should be set at minimum pressure permissible with which to accomplish the cure desired, and it is advisable to have it set at least five pounds under allowable safe pressure.

13. Before opening heater doors, turn off steam, open blow-off valve until steam gage indicates no pressure, then open relief valve and bleeder valve to drain away all water. Do not flush heater with cold water until all steam has been completely exhausted.

14. Do not enter heater if there is any hot water lying on bottom, nor if steam feed valves are not closed tightly, nor if there are any fumes inside which are detrimental to health. See that blow-off valve of an open heater is closed.

15. Use care in tightening bridge track so it will carry load safely. Do not store bridge track where persons may fall over it.

16. In general, the employees should be instructed thoroughly as to the proper use of the equipment and the dangers due to improper use.

TESTS, INSPECTION, MAINTENANCE

1. All vulcanizers should be inspected regularly by specialists, and a careful record kept of inspection. This record should be checked periodically to see that inspections are actually made and recommendations complied with promptly. (See forms which follow.)

PRESSURE VESSEL INSTALLATION RECORD

Dept. No. Bldg. No. Floor.
Insurance No. Plant No. Dept'l No.
Class of Vessel. Type.
Use
Maximum Steam Pressure Allowed. Operating Press.
Safety Valve Set at.
Hydraulic Pressure Allowed. Operating Press.

SPECIFICATIONS

Inside Diameter. Length of Shell.
Thickness: Shell Plate. Head Plate.
Joint: Horizontal. Girth.
Rivets: Dia. Pitch:—Horiz. Girth.

Door and Ring

Type Make.
Material Door. Material Ring.
No. of Bolts or Lugs. Loose or Hinged.
Diameter of Bolt Threads. Section of Lugs.

CONNECTIONS

Main Steam Supply: Size. Location.
Pressure Regulator of Control: Size. Make.
Steam Gauge. Location. Thermometer.
Safety Valve: Size. Type. Location.
Blow-off Line Size. Location.
Trap Size. Make.
Hydraulic Connection Size.
Extra Connection.

Manufactured by. Job No.
Date Placed in Service
Date Removed. Disposition.
Remarks:

Filed

PRESSURE VESSEL INSPECTION REPORT

Date.
Dept. No. Bldg. No. Floor No.
Vessel No. Class of Vessel.
Type Use.
Maximum Steam Pressure Allowed.
Operating Pressure
Safety Valve Set at.
Maximum Hydraulic Pressure Allowed.
Operating Hydraulic Pressure.

RESULT OF INSPECTION

Safety Valve(opened)—(pulled)—on test at. lbs. Steam Pressure
Report the condition of the following:
1. Safety Valve Is it Certified?
2. Steam Gauge
3. Shell and Heads
4. Joints
5. Piping, Connections and Valves
6. Steam Trap
7. Doors, Bolts, Nuts, Lugs, etc.

8. Door Hoists
 9. Heater Car, Track, Bridge, etc.....
 10. Heater Insulation Cover.....
 11. Are all parts in condition to bear the working pressure at a factor of Safety
 of not less than Five?.....
 12. Floor and Structure Supporting Heater.....
 13. Miscellaneous Recommendations.....
 Date..... Signed..... Insp.
 Referred to..... Date.....
 Recommended Alterations Completed, Date.....

2. All valves should be tested daily and special attention given to safety pop valve.

3. At least once every two months safety valve should be tested under full pressure until it pops, care being taken that the steam gage used in this test is correct, and that the pressure is not run up greater than the safe allowable pressure in heater.

4. In dusty rooms, safety valves may become sealed shut if not tested periodically.

5. Steam trap needs perhaps most attention to keep in working condition. Sediment from heater often makes trap inoperative so that condensation will collect in heater.

6. Particular attention is drawn to worn out seats of valves which would permit extra pressure to enter heater.

7. Riveted joints should be inspected as well as corrosion of steel shell. In many heaters, especially for hard rubber cures, a sulphurous acid attacks and deteriorates the steel shell very rapidly.

8. At each inspection, it should be determined if all parts are in proper condition to bear the working pressure at a factor of safety of no less than five.

9. Bolts for doors require usually close inspection as well as the lugs on quick opening doors, to see that no metal is fatigued or ruptured. Bolts and nuts, badly worn should be replaced. If hinged bolts are used, hinge pins should bear no part of bolt load.

10. Hoists for doors, especially lifting cables or chains, must have ample and safe capacity.

11. Heater tracks and bridges must be secured so as not to spread and allow truck load to upset.

12. If heater sets on an upper floor, instead of a foundation in earth, inspection of the strength and condition of the floor construction must be made, especially if of wood. Around heater there is a great amount of moisture from heater and molds which will rot a wood floor in a few years so that it may be required to replace the floor entirely.

13. It should be ascertained if the heater will withstand safely the pressure carried in the main steam line, if, for some reason, this pressure may unexpectedly occur.

PART II—MILLS AND CALENDERS

These recommendations are intended principally for use of rubber manufacturers and should be followed by their employees in the construction

and operation of mills and calenders. They may also serve various inspectors in recommending improvements of existing installations.

Recommending dimensioned details of construction is omitted because it may prove unsuitable to existing conditions in some factories. Such data, giving the standard practices of several companies, may be found in a paper entitled "Safety and Sanitation for Rubber Mills and Calenders," published in the Proceedings of the National Safety Council Ninth Annual Congress, Rubber Section.

Reference is also made to various codes obtainable from or through the American Engineering Standards Committee or National Safety Council:

CODE	SPONSORS
Power Control, Electrical	International Association of Industrial Accident Boards and Commissions
Power Control, Mechanical	American Society of Mechanical Engineers
Electrical Safety Code	National Bureau of Casualty & Surety Underwriters
National Electric Code	Electrical Safety Conference
Exhaust Systems	National Bureau of Casualty & Surety Underwriters
Lighting Factories, Mills and Other Work Places	Bureau of Standards
Floor and Wall Openings, Railings, and Toeboards	National Fire Protection Association
Sanitation, Industrial	American Society of Heating and Ventilating Engineers
Protection of Heads and Eyes of Industrial Workers	Illuminating Engineering Society
Ladders	National Association of Mutual Casualty Companies
Power Transmission Apparatus, Mechanical	United States Public Health Service
	Bureau of Standards
	American Society of Safety Engineers

In addition to the above list, the following list of Safe Practices Pamphlets issued by the National Safety Council, is made reference to:

Shafting, Coupling, Pulleys, Gearing
 Oiling Device and Oilers
 Floors and Flooring
 Safe Clothing
 Exits, Fire Alarms, and Fire Drills
 Accident Records
 Shop Lighting
 Fire Extinguishment
 Electrical Equipment in Industrial Plants
 Fire Causes and Prevention
 Hoisting Apparatus
 Industrial Ventilation
 Industrial Housekeeping
 Practical Methods for Reducing Fatigue.

Suggestions for safeguarding health are given, for poor physical condition may be the indirect cause of an accident.

MILLS

Hazards. Greatest dangers for injury are caused by the following: gears, rolls, feeding and removing stock, starting machine, electric shock, defective or broken machine, knives and cuts, hot surfaces, inattentive and careless operation, illness, congestion around machine, slippery floors, inadequate light and ventilation, dirt and dust.

Gear Guards. (*See National Safety Code on Mechanical Transmission.*) Gears should be guarded most thoroughly if a workman may be adjacent to them. The outside perimeter or face of gears should be enclosed with a sheet steel band to prevent oil or grease from depositing on the floor and in mill pit. For most thorough guarding, a solid enclosure of steel plate should be provided over face of gears and down the sides beyond the depth of teeth, and the point of contact between gears covered completely. Projecting keys, and other projecting revolving parts, such as ends of mill rolls, as well as spokes, should be covered with removable wire mesh, which will allow visual inspection of the gears, and the guard designed so it may be quickly removed when necessary to repair the mill. Guards should be attached neatly and rigidly to a machine to prevent rattling or sagging, or being knocked out of shape.

Safety Throwout to Stop the Mill: A safety throw-out bar or device heavy enough to resist the struggling of an injured operator should be placed above the mill rolls to effect a cut-off of power. This device should be located within easy reach of operator from front and rear of mill and should extend across the entire width of mill. Nothing else should extend across mill which can be mistaken for safety bar. The distance traveled by throw-out bar should be slight, say three inches, so power may be cut off quickly. Throw-out bar should operate when pushed in any direction, and with very little force, say not to exceed five pounds, and should be constructed so operator cannot wedge the device if he thinks bar operates too easily.

There are three predominating methods of cutting off the power from the mills: (1) magnetic clutch brake mounted on motor shaft, (2) mechanical clutch on the motor shaft, (3) dynamic braking of the motor. The method adopted should shut down mill in the shortest time possible, without undue injury to machine. If safety cut-off mechanism is kept in operation by power, (electric, compressed air, etc.) failure of such power should stop the mills. The mechanism which connects throw-out bar to power cut-off should operate freely and without lost action. The whole cut-off mechanism should be constructed so that power cannot be carelessly turned on unexpectedly, and should be rugged enough to be used as a regular service stop, so that workmen will become accustomed to its use. Electric cables controlling safety mechanism should be enclosed in conduits, to prevent damage being done to them, making them inoperative. Daily tests and inspection should be made to determine the condition of the safety stop device, and a record kept of the surface travel of the rolls after throw-out bar has been tripped.

For a group of mills driven by one power unit, only one power cut-off device should be used. For instance, if a clutch is used for cutting off power, only one clutch should control the entire group of mills. This will insure quicker stopping on any one mill because the resistance of the others will assist. Depending upon the type of power cut-off adopted, electrical or mechanical, reference should be made to National Safety Codes on Safeguards for Electrical or Power Transmission Equipment.

Speed of Machine. Mill roll should revolve not more than 25 R.P.M. Higher speeds make cutting and rolling of stock difficult and dangerous. Roll speeds should not be governed by a general specification of surface speed. From a safety standpoint, mills with large diameter rolls should be given preference.

Distance from top of rolls to floor upon which operator stands should be great enough that operator cannot easily reach into bite of rolls.

Definite Position of Operator. A guard bar, or edge of mill pan, should be located to prevent operator's placing his hands beyond top of nearest roll. A mill should be constructed and its operation governed so an operator can do all his work by staying on the floor.

Feeding and Removing Stock. Feeding stock into, and removing from rolls should be controlled by strict regulations. (See rules for operator.) To determine opening required between rolls, run a test piece of rubber through, instead of standing in pan to look into bite. Automatic mechanical devices reduce manual operations and are safest. Several successful ones are in use, among them the well-known mixing apron. The mixing apron should have abundant clearance above mill pan. Feeding of rubber and pigments through chutes into mill has been successful. There are also other machines constructed to replace mills. These mix rubber and pigments in an enclosed vessel, and are fed and exhausted automatically, but their success is not acknowledged universally.

Starting Signals. Operators should be made aware of the intention to start machinery in ample time to remove themselves from danger. A signal bell or noise producer is best, and should be connected to starting switch or levers so bell will ring before it is possible to operate the starter. Starter should be located so entire line of mills controlled may be seen.

Electrical Equipment. Reference is made to the National Code of Electrical Safeguards. Outside of the usual electrical hazards covered by various codes, the rubber industry has at least one other hazard, i. e., danger around electrical equipment in washer mill rooms where the floor may be wet. Around such equipment, if the floor cannot be kept dry, a raised platform or other means should be provided for maintaining a dry surface for workmen to stand upon.

Extricating Injured Workmen. Provision should be made to separate mill rolls quickly so as to release an injured operator at the earliest moment. Some factories permit reversing rolls, but others very forcibly forbid it, claiming that additional and irreparable injury is done.

Miscellaneous. Where safety breaking cup is used on end of roll adjusting screw, a screen or band should enclose cup, so there is no possibility of metal pieces flying when cup breaks. A method which will not cause flying of broken pieces should be provided to prevent rupture of mill rolls.

All parts should be so protected that oilers and maintenance workers may carry on their work without danger.

Knives should be handled carefully and kept in heavy sheaths when not in use.

Clothing worn by workmen should not be too loose and dangling.

Proper gloves should be worn when rolls and stock are hot enough to cause burns.

Shoes should be in good condition and not cause men to trip and fall.

Operation of Machine. All parts of mills, safety devices, transmissions, and supporting structures, should be inspected constantly to maintain in good operating condition.

The most important precaution, mental alertness, should be developed in all workmen. Each workman should be educated fully concerning the duties he shall perform and the dangers to which he may subject himself. He should prove himself fully qualified before operating a mill.

The following rules with appropriate additions and modifications should be placed where the workmen may observe them frequently.

1. Follow instructions of your foreman and your inspectors only.
2. Wear no clothing which can be caught in the machines, such as long sleeves, loose neck ties, aprons or unbuttoned jackets.
3. Keep your eye on the job all the time, and give your work your entire attention.
4. Keep your hands off moving rolls.
5. Never force rubber into the bite of the rolls with your hands.
6. Never oil, clean or repair your machine while it is in motion.
7. When cutting stock off roll, always cut below the center.
8. If you feel ill, or in such condition as to interfere with your work, report at once to your Foreman.
9. Stop machine at once in case of emergency. Do not wait for instructions.
10. Never allow your hand to go past the top of the roll, and never reach over one roll to work on the other.
11. Watch your hands when the rubber folds over. Don't let them get caught in the folds. Be careful in doubling the ends of batches when "batching out."
12. Never cross arms when cutting or rolling stock from the mill. Learn to cut and roll with both hands. When cutting from left to right, cut with right hand and roll with left; when cutting from right to left, cut with left hand, roll with right.
13. Never take anything out of the rolls while the mill is in motion. Stop the machinery.
14. Never stand on the mill pan, compound boxes, platforms or makeshifts.
15. Never work with one hand under the rolls while the other is above them.
16. Take care not to catch your fingers between guide and roll.
17. The back roll of the mill runs faster than the front. Be careful.
18. Do not indulge in "horse-play" and practical jokes around machinery.

General Requirements. Foundations, especially where mills set on upper floors, should be rigid and prevent excessive vibration. Provisions should be made to avoid dripping of oil and water onto building structure where rot and corrosion will weaken structure.

The working floor area around mills should be free of depressions and elevations, and of various materials, boxes, tools, etc., scattered about.

Floors should be of non-slip construction and materials. Removable passages over pits and line shafts should be well supported and non-slip. Pits and pipe trenches should be easily accessible for thorough cleaning, and so constructed and protected with curbs and covers that refuse, dust, tobacco sputum, etc., cannot be easily deposited in them. Pipe railings, should enclose pits and exposed electrical and power transmission equipment.

Illumination. Safety and cheerfulness should be encouraged by providing good light. Provide maximum daylight. Consult National and State Codes regulating artificial lighting. Local lighting should be installed inside of ventilating hoods over mills, and in other places where general lighting is not sufficient, and so that glare does not blind workmen. Local lighting lamps should be covered with screen, if subject to breakage. Intensity of local lighting should be same as general lighting. Lamps and reflectors should be kept clean.

Walls and ceilings should be painted a proper color and finish to distribute maximum light.

Ventilation. Good ventilation of mill and washer rooms should prevail. Natural ventilation of washer and warmer mill rooms through windows and skylights can be accomplished satisfactorily, but in mixer mill rooms where injurious dust and fumes from pigments are prevalent, mechanical ventilation should be provided. The ideal ventilating system should heat, clean and humidify the air furnished, and carry away all dust and fumes which would fill the room. A hood should be installed above each mixer mill, connected to suction fan, to carry away fumes and dust arising from mill rolls. If air washer is not provided, dust should be gathered in a collector and not allowed to scatter into surrounding territory. Clean air, heated in cold weather, should be supplied to offset the air exhausted through mill hoods.

General Cleanliness. Dust, which collects on machines and various parts of building and floor, should be removed by some method which will not stir it up and scatter it elsewhere. Vacuum cleaners will meet this requirement.

Pits and trenches should be kept free from grease, dirt, lunch scraps and tobacco sputum. Cuspidors should be provided plentifully and appropriately situated.

Window glass should be cleaned periodically, as well as walls and ceilings to provide good light.

CALENDERS

The following topics have been discussed under Mills: Hazards of gears, rolls, defective machine, burns, careless workmen, illness, con-

gestion around machine, slippery floors, light, dirt; recommendations for the above, and extricating injured workmen from rolls, electrical apparatus, clothing, inspections, tests, maintenance, instruction and qualification of operator; foundations, floors, railings, pits.

Additional hazards on Calenders are as follows:

Continuous starting and changing speed, operating calenders in train, feeding and removing fabric and sheet stock, windup and idler rolls.

Gear Guards. The windup train of gears should be enclosed with solid plate or casting because workmen are very close and to prevent threads from edge of liner getting into gears.

Safety Stops. The methods described for mills are equally adaptable for calenders. Calenders are usually driven by direct current motors, and, therefore, dynamic breaking of motor is perhaps most simply applied and operated.

A safety throwout bar should be placed full width across calender outside of housings in both front and rear and operated when pushed in any direction.

In addition, a throwout bar should be placed at each entering point of rolls, except at gum feed, about five inches above bite of rolls, if this arrangement does not interfere with essential attachments on machine.

An optional arrangement is that of having four vertical cables, one to hang inside of each housing, front and rear of rolls. These throwout bars, or cables, should cut out the electric switch, release clutch, apply brake or operate any other device by which the Calender is to be stopped instantly. A clutch if used should be placed between motor and motor pinion; and a brake, on the motor pinion shaft.

Signal bells, or equal, should give warning each time calender is to start, or change speed. One bell should be so located that any workman can signal when he desires the calender to start or stop and another bell directly connected with the starting and stopping controller. The latter bell will automatically warn all workmen.

If calenders are operated in train, the safety stop appliances should be so constructed that operation of the safety throwout on any calender will stop the entire train. Operation of a train of calenders should be as a unit, and under control of one operator, the only person who can start and alter the speed of the machine.

Roll Speeds. Calender speeds, being variable, are not necessarily to be limited. When sheet stock is fed into and removed from the rolls, the speed should be reduced so the operation is not hazardous.

This safe speed may vary according to kind of gum, stock, thickness, etc., but it is generally considered that a speed of fifteen yards per minute should not be exceeded when threading sheet stock into the rolls.

Idler Rolls. Idler and spreader rolls and spreader bars should be placed far enough from main rolls so operator cannot be pinched between them.

Feeding and Removing Stocks. Feeding stock, particularly fabric and sheet, into calenders and windups has caused the greatest number of accidents on these machines. Comparatively few accidents occur from feeding batched gum. A sheet metal table about twelve inches wide and the

length of rolls, located about six inches below bite of rolls should be provided to hold batched gum while it is being fed into machine. Wood paddle or pusher should be used to push stock into bite of rolls.

Feeding fabric or sheet gum is not so easily accomplished, and it is necessary for operator to place his hands close to the rolls, unless a guard is installed to assist in starting the fabric into the rolls. Although numerous efforts have been made, it seems that no guards of this type have been devised to meet general approval, and experimental ones have usually met opposition from the workmen as being a hindrance to rapid and successful work. Such a safeguard is needed to feed sheet stock between closed rolls, but the space available is not always sufficient to provide safety without impeding production by making it difficult for workman to place sheet within a reasonable distance from the rolls.

If a calender does not require the two bottom rolls to be in contact with each other, and if the bottom roll is used only as an idler roll, to return the stock to other side of calender, then the bottom roll should be lowered about three inches, a sufficient opening that a man's arm can pass between the rolls and not be pinched. Where the rolls cannot be separated to such an opening, it may be possible to separate them to such an extent that a guard can be used successfully. A guard used in several factories consists of two horizontal steel plates about $1\frac{1}{2}$ " apart, extending in between the rolls. The lower plate does not extend so far inwardly as the upper plate, and this allows workman to place the stock onto the lower roll; and if the travel of the roll should carry his fingers forward they will strike the upper plate without harm. This guard should be constructed very heavily, and be very rigidly attached to the machine. A scraper bar is attached to the lower plate of the guard after the guard is in place, and so adjusted to the roll that there is only a very small clearance between the scraper and the roll. This scraper is for any stock which may get around the lower roll and which would have a tendency to roll up under the guard and bend it out of shape.

A man who has been working on a calender with separated rolls should never be transferred to another calender having its rolls in contact, for the knowledge of not being subjected to danger on the first type forms a habit of placing the hands between the rolls, and this habit will unconsciously be continued on the latter type and result in injury.

Windup. All wind-ups and let-offs should have a stationary handwheel for adjusting the tension in stock. This can be accomplished by mounting the handwheel on the windup bearing, the outside of the bearing having screw threads upon which the handwheel adjusts itself against the friction disc.

To hold the stock shell bar into the windup spindle, a smooth ring should slide on the spindle and cover the end of bar. This ring can be locked in position by a pin with a spring. No projecting set screws or pins should be placed on any revolving part of the windup.

Lifting Rolls of Stock. Lifting rolls of sheet stock into and out of machine should be governed by existing codes for handling materials.

The present tendency is toward large diameter, wide and heavy rolls of stock, and power hoists should be provided for handling them.

Quick Separation of Rolls. Means for quickly separating rolls should be provided for extricating injured workmen, so it will not be necessary to reverse the rolls. If hand wheel operated roll adjustment is not quick enough, motor driven adjustment should be substituted. It is possible to connect the latter to the safety throwout device, so that the rolls will automatically open when safety bar is tripped.

Safeguarding Electrical Parts. Each calender, usually having its own motor, controller and panel boards, the electrical hazards to operators are more prevalent than on mill lines. All switches and control boards should be of enclosed type, and situated preferably in an enclosed room where only one operator may have access to it. The prevailing electrical codes should be strictly complied with.

Floors. Non-slip floors should be laid around calenders. Between the housings of calender it is usually not practical to lay a concrete floor, so a metal surface predominates. This metal should have a non-slip surface.

Illumination. Illumination for calender work is important, not only to safeguard the workman, but particularly to produce work of highest quality. Too many calenders are being operated with local lights attached to the machine. The general lighting system described for Mill Rooms is recommended for calender rooms, except that the maximum amount of light should be given the calenders, and a lower intensity in the aisles. The intensity on the calenders ought to be 10 foot-candles uniform lighting, and about five to six foot-candles uniformly in the aisles. If glare is eliminated this difference in intensity will not produce eye strain.

Ventilation. A calender may produce excessive heat or fumes, making it advisable to install a ventilating hood above, connected to an exhaust fan. However, it is far better to have a high calender room, preferably one story, with saw-tooth skylights to give good natural ventilation and light. If the room has a low ceiling then mechanical ventilation should be provided, especially during summer months and times of high humidity.

Cleanliness. Where excessive soapstone or stock dusting accumulates on floor under calender windup and letoff, a system should be provided. This dust should fall onto and through a latticed or perforated floor into a chamber from which it is drawn into a duct and to an exhaust fan.

The vacuum cleaner principle has been applied to the cleaning of liners and this obviates most of the flying dust around calender let offs and windups. A vacuum cleaner is of even more importance in a calender room than in a mill room, for in addition to the benefit to workmen, there is an extreme necessity for cleanliness of calendered stock.

Chairman Beck: I would like to hear a motion that we meet again this afternoon and finish our job.

(Motion made, seconded and carried that a committee be appointed by the Rubber Section to meet with Mr. Congdon's committee, and that the Rubber Section convene again at two-thirty P. M.)

WEDNESDAY AFTERNOON SESSION

Chairman Beck: I would like to have our engineering committee chairman, Mr. Mitchella, preside this afternoon because this is an engineering subject.

Mr. R. H. Leveridge: The point I wanted to raise is this: Are the rubber workers of the country willing to proceed with the standardization of safety equipment for their plants, or do they want the states as individuals to shape up drastic regulations which they will have to live up to? If this is not the time to standardize, when is it time to standardize? Certainly the accidents we are having in the field today clearly indicate that it is time that we did something and the question that must be decided is whether the rubber workers of the country are ready to prepare something that is acceptable to them as a standard for the various states to follow which they will eventually have to do because the American Engineering Standards Committee will take up the standardization.

(At this point, Mr. Mitchella took the Chair.)

Chairman Mitchella: I think I can safely say that there was no attitude expressed by the members as to whether they would prefer state or national control, although I think we would all agree that a national code would be very advisable, and more suitable to all of us.

DISCUSSION

Mr. Leveridge: Concerning the selection of some particular method to the exclusion of any other, such a thing was never intended in the preparation of this tentative draft of the code. No code we have ever adopted in the State of New Jersey has closed the door on development.

Mr. Congdon: I was one of those who answered Mr. Mitchella's last letter. Since that time I have changed my mind somewhat. I think if he approaches the subject of standardization in the two phases Mr. Leveridge has brought up, we will make more progress.

Mr. E. A. Hoener: I think one of the biggest questions that comes up in a code of this kind, is the feature of making it retroactive, in other words, changing all your existing equipment in a period of time. According to the present reading of that code and the stops therein specified, it practically limits the equipment necessary to make that stop to possibly one, or on the outside, two types of stopping equipment that are now in existence, and automatically throws out all of the stopping equipment which is now being used in the majority of the rubber plants, particularly in the City of Akron.

That is one of the big stumbling blocks in the adoption of a code like this; the feature of trying to make it retroactive and to change the equipment. If it were on the basis of new equipment, or future installations, I feel we could get on a common ground much quicker than we can on the basis of changes to existing equipment.

Mr. Thropp: I stated in my paper this morning that with a small change which I understand would not be over 50 or 75 dollars, this could be made 50 per cent better. On the calenders, this is also true. On

the question of standardizing, it would be better if every state in the Union had the same standard. It is going to be hard if Ohio has one standard, New Jersey another and Pennsylvania still another.

Another important question is the method of tests. You have got to do it with mechanical or electrical testing apparatus. You must adopt some method of testing. The second thing is for everybody to make tests.

Mr. Leveridge: It wasn't the intention to make this code retroactive, except in so far as it actually states. It states: "New installations shall be in conformity with this code." It also states "Existing installations, within a period of two years, shall be made to conform to these rules, as nearly as practicable."

(At this point, Mr. Beck resumed the chair.)

Mr. Mitchella: As I stated this morning, owing to the disagreement between various members of the section, we of course could not standardize. There was only one procedure to follow and that was to generalize on the results which we wish to obtain.

On vulcanizers, of course, we had great deal more success than we did with mills and calenders.

(Mr. Mitchella abstracted the report of the Engineering Committee.)

Mr. G. A. Lyons (U. S. Rubber Co., New York): I move that the report of the engineering committee as summarized by the chairman and incorporated in the proceedings, be accepted, subject to any criticisms or suggestions that may be received at that time.

(Motion seconded and carried.)

Chairman Beck: I would like Mr. Mitchella to handle the meeting from now on. I think it is his privilege to handle the meeting inasmuch as he did so much good work on this problem and is so much more familiar with it than I am.

(At this point, Mr. Mitchella took the chair.)

THE QUESTION OF AUTHORITY

Mr. Horan: In paragraph 104 of the code, you specify "authority having jurisdiction." That is quite broad. Might I ask just who the authority is?

Mr. Leveridge: When this code is put into effect in New Jersey, the words "The Department of Labor" will appear instead of "authority having jurisdiction." That would apply in all places where we refer to "supervising department;" the name of the department is inserted.

Mr. H. H. Graef: In that paragraph 106, I would like to ask just what Mr. Leveridge had in mind as to the decision on whether or not the installation met requirements. Would that be up to the local inspector or the Labor Department?

Mr. Leveridge: Answering specifically, I think we will all grant that an inspector in the field who is required to cover every code or engineering subject that is supervised by the Department of Labor, can't be sufficiently expert in every division to be the last word on that subject. When the district inspector requires something that seems unreasonable

to an industry, it has recourse to the head of that particular bureau, or, as a last resort, to the commissioner who is supreme authority, or the industrial board, as the case may be. It is the same procedure as you would follow in court; if you don't get satisfaction, you go on up to a higher court.

Chairman Mitchella: I don't like that 46 in. in paragraph 111 because I find that 50 in. is perfectly satisfactory in installations at our plant. We have 50 in. on all of our mills and washers with the exception of some of the very oldest which were installed in the Diamond Rubber Company twenty or thirty years ago. I am very much in favor of a high mill.

Mr. Horan: We had some mills we had to put platforms on. I was wondering whether it would be better to specify; for instance in the case of a washer, you could put the washer up 72 in. high; the platform 50 in., and the rolls still 12 in. above where the employer stood. I was wondering whether it wouldn't be better to specify "at least 46 in. above the working level."

Chairman Mitchella: How about "floor upon which the operator stands?"

Mr. Leveridge: I quite agree with you. We will change it to read "floor upon which the operator stands."

Mr. H. H. Graef: Would it be possible to change from "safety trip bar" to "safety trip device"? In the particular plant I represent, we do not use rigid bars; we use stranded wire cable. It answers the same purpose and is in the same location. It just makes it more general and gives wider field for the manufacturer, if you used the word "device" instead of "bar."

Mr. Horan: My suggestion would be that you make it "device" and then put at the end of the present sentence a statement that the use of a rigid bar should be encouraged or installed. Make the bar advisory and the device mandatory.

Mr. Leveridge: The idea in shaping the safety bar was that a man could, by raising his head, throw out that trip. We find it can't be done with a cable.

THURSDAY MORNING SESSION

Chairman Beck: We obtained two committee reports yesterday.

REPORT OF MEMBERSHIP COMMITTEE

E. L. HEWITT

At the time of the Boston Congress in 1921, we had on our roll, 25 members. At the time of the Detroit Congress in 1922, we succeeded in obtaining eight new members, but due to the fact that we lost three, our net gain was only five.

This past year we have succeeded in getting 12 new members and by losing two of the old membership, we have had a net gain of 10. In other words, during the last two years from the time of the Boston Congress, when the intensive membership campaign was put on, we have succeeded in obtaining 15 new members.

I can't help but feel the work that has been done by your executive committee and membership committee in the last two years is going to bear results in the future. The plan was laid down some year and a half ago by the executive committee and the membership committee has served as a means of tying up the work of the two committees. Your executive committee deserves all the credit. I believe we have at last a good foundation for future membership work and we have covered, I believe, the large number of rubber companies who are prospects and through the cooperation of the Rubber Association of America we have been able to compile fairly accurate lists of prospects.

There is one point, however, that I would like to stress. We have gone quite a way in the matter of soliciting by letter. Several form letters individually typed have been sent to the various rubber companies and when there has been any indication of interest, they have been followed up with personal letters. One other means is open and I believe if followed properly would be effective, that is the personal solicitation end of the work. The present Rubber Section members are scattered throughout the country. By a little effort on the part of the individual members, I believe they could help solicit some of the rubber companies who are not members in their vicinity.

Sometime ago the membership committee drew up a sectional list, but unfortunately the executive committee had all they could handle at that time, so there hasn't been a whole lot done on that. I would recommend that to the new membership committee.

Mr. Beck has asked me to say a word about how to join the Rubber Section. I have all the membership blanks you need. All you have to do is mail one with your check to the National Safety Council and you automatically become a member. As to what you get for your membership: One of the big things to my mind, is the bulletin service. I know personally we use the bulletin service as the background for publicity on health, safety and sanitation and found it to be effective. True, there aren't enough Rubber Section bulletins to keep all satisfied, but by carefully selecting the general bulletins, they work in very nicely.

In addition to the bulletin service, the section has for the past two years gotten out news item letters, containing items of interest to men in the rubber industry and several questionnaires. The safe practice committee have been doing good work along specialized lines in the Rubber Section and I believe that is material which is well worth while.

These special sectional activities in addition to the Safe Practice pamphlets issued by the National Safety Council on general hazards are well worth while. If your library isn't complete, it should be. There is a wealth of material if you will use it. I think the difficulty with the people who join is, they don't use the service available.

Each membership carries with it a copy of the *Annual Proceedings* covering all the sectional meetings which are held at the various Congresses. That in itself is a library on safety matters which is well worth having and preserving.

I think in general that covers the situation. If any of you are interested in joining, I will be glad to see that you get application blanks after the meeting.

REPORT OF STANDARDIZATION AND STATISTICS COMMITTEE

G. I. LYONS

Since his appointment at the last Safety Congress at Detroit, the chairman of this committee has submitted three reports to the members of the Rubber Section, the first covering the accident experience of the Rubber Section for the first six months of 1922, the second covering the last half of 1922 and the third covering the first six months of the present year.

In the August, 1923 issue of the *National Safety News*, there appeared a summary, compiled from statistics furnished by the chairman of this committee, showing the accident experience of the Rubber Section for the years 1921 and 1922. You will recall that the average severity rate (days lost per thousand hours worked) for this period was .898 and the frequency rate (accidents per million hours worked) was 32.13. The same issue of the *National Safety News* included a table showing the standing of the Rubber Section as compared with the Automotive, Cement, Construction, Metals, Paper and Pulp, Petroleum and Woodworking Industries. The rates mentioned gave the rubber industry second place, the automotive industry being the only one with a better accident experience.

Our statistics for the first six months of this year, however, would indicate that we did not come anywhere near the "bogie" of .898 in severity and 32.13 in frequency, because at the end of June our severity rate was 1.50 and our frequency rate 35.83. In explanation of the increase in the severity rate, the big difference was caused by seven fatalities and one permanent total disability which the Rubber Section experienced during the first six months of this year the fatalities being equal to the total number of fatalities for the years 1921 and 1922.

CAUSES OF ACCIDENTS

The chairman would like to call your attention to the following brief analysis of the causes of our accidents during the past two and a half years:

	1st 6 Months 1921	2nd 6 Months 1921	1st 6 Months 1922	2nd 6 Months 1922	1st 6 Months 1923
	Percent. of **Total	Percent. of **Total	Percent. of *Total	Percent. of *Total	Percent. of *Total
Handling tires and materials.....	31	22	33	37	33
Hand tools and accessories.....	30	27	17	14	19
Machine accidents	10	9	13	14	16
Eye accidents	7	16	10	5	4
Wire cuts, scratches, nails.....	7	12	2	2	1
Burns	5	4	2	3	3
Falls	2	2	6	7	6
Miscellaneous	8	8	17	18	18
	100%	100%	100%	100%	100%

*Lost time accidents.

**Lost time and no lost time accident figures combined for the year 1921.

It is interesting to note the similarity in the trend of accidents during the last three periods. "Handling tires and materials" and "hand tools and accessories" still account for over 50 per cent of the total number of accidents. "Machine accidents", while not as frequent as in other industries, are on the increase, probably due to the fact that companies are now installing more labor saving machinery than in the past and consequently the machine hazards have been increased accordingly. You will note also that there has been a slight improvement in eye injuries. The item "miscellaneous" is running too high. Part of this includes causes which had been reported to the chairman under classifications other than those shown on the accepted form. However, after taking this into consideration, it is necessary that special care should be exercised in the future in classifying accidents in order to keep this figure at a minimum.

IMPORTANCE OF ACCIDENT STATISTICS

There are numerous ways in which the accident statistics of the Rubber Section can be used to advantage. First of all, from the figures furnished by the various members, a summary is drawn off, which, because of the fact that it has been accepted as standard by the Bureau of Labor Statistics and the National Safety Council, makes it comparable with the accident figures of companies in other industries and these figures, if kept conscientiously over a period of years, will indicate which of the industries are the most hazardous. Furthermore, several companies are also using these statistics within their own organizations to sell safety to the management.

From the reports sent to you during the last year, you have probably noticed the increase in the number of companies included in the reports. Whereas last year only nine companies submitted accident statistics, today there are 15 and it is hoped that more companies will co-operate with the new chairman in his work during the coming year.

REPORT OF HEALTH HAZARDS COMMITTEE

C. F. HORAN

We are at work at the present time on two reports. The first report deals with the frequency of the hexa-rash. That is the result of the questionnaire we sent to all of the rubber companies and which most of you have answered.

We didn't get enough specific detail on the first questionnaire to justify any conclusions except this, perhaps that hexa-rash is quite frequent or has been quite frequent in the rubber industry and that most companies have substituted biphenylethylamin or triphenylethylamin for the hexatetramine. From the returns which the committee now has, they would seem to indicate that within a very short time hexa-rash or rubber itch will be a thing of the past.

The other material on which the committee is working is in connection with a group of life insurance companies. I don't know whether you people know it or not, but with most of the American life insurance

companies, an employee in the rubber industry pays a special rate for life insurance because of the fact that he is in the rubber industry. There isn't any doubt but that there are certain occupations in the rubber industry where the possibility of fatality is greater than the average standard, or individual, if there is such a thing as an average individual in this country. Some of the companies charge as high as 135 per cent of the standard rate to anybody in the rubber industry. It means that your employees and our employees are paying an unusually high premium for their insurance.

The committee has been able to interest quite a number of the insurance companies, especially the New England companies and some of the other eastern companies, in getting a real classification of the hazards in the rubber industry and I am glad to say that on some of the occupations in the rubber industry, they will not only pay 135 per cent, but they won't pay 100 per cent of the standard rate. We feel that that is fairly good. We had hoped to get out a report this last year giving the various occupations in the rubber industries and the possible hazards. That looks simple.

We took one industry and a code of occupations in one particular plant and found almost 100 different names for different occupations. That meant in one type of plant, taking 1,800 names, almost distinct occupations, and finding out what the hazards were in each of them. You can readily realize that can't be done in five minutes.

There is one other thing the committee would call your attention to; it is one thing where you can help us. I don't know whether you have noticed the tendency of some of the departments of labor and legislatures to pass rules on other things than mechanical safety. The State of Ohio at the present time has a committee to formulate rules and regulations for the rubber industry mainly for the prevention of occupational diseases, and Ohio is going to have some rules. I am not certain now whether they have them already. They have a committee working on them.

The health hazards committee of the Rubber Section wishes that you people would keep in touch with the activities in your various states and if you find a committee appointed or any legislation concerning the new regulations for the prevention of occupational diseases in the rubber industry, you would let us in on it. Usually, we get in when it is too late. If we knew about the organization of the committee, we could give the committee such facts as it might need.

You might be interested in the experience of Massachusetts on fatalities in the rubber industry. In the last six years in Massachusetts, 64 per cent of all fatalities in the rubber industry have been due to occupational diseases.

REPORT OF SAFE PRACTICES COMMITTEE

W. L. SCHNEIDER

The information presented has been prepared as a result of the varied experiences of injuries traceable to handling material in rubber manufac-

ture and is intended, primarily, as a guide for the prevention of injuries and the adoption of Safe Practices in the handling of the materials as outlined. It is the desire that the pamphlet may be useful in serving safety engineers, state inspectors and others in the prevention of accidents incident to the working conditions, as outlined. (Reference: National Safety Council Safe Practices Pamphlets 54 and 55.)

RAW RUBBER

Receiving and Unloading Cars—As most safety engineers in the rubber industry know, certain accidents are traceable to the handling of materials as related to receiving and unloading in the handling of raw rubber from freight cars, as they are usually spotted on the siding and the doors opened and the rubber unloaded. The rubber is usually received in cases or bales, varying from 150 to 600 pounds. These are usually piled on top of one another inside of the car, and, if carelessly piled, are liable to fall as the doors open.

It frequently occurs that doors are in bad order, with the result that they have to be pried open, and, if the material is improperly piled, it may fall out and cause serious injury. Faulty brakes on the cars and jarring due to switching may also cause the cases to become dislodged. Frequently, pinch bars are necessary to open the doors, with a possibility of dislodging the door entirely, which, in some instances, also causes serious injury.

When cars are received, they should be thoroughly inspected to see that the brakes are in good condition, that they are properly spotted with respect to clearance at siding, and that the doors are also in good repair. Care should be exercised in spotting and in opening doors, and it is always well to carefully inspect the hangers to see that the door is properly hung. If necessary to pry open the door, workmen should stand clear of the door, as doors frequently fall, causing serious injury. It is impossible to tell how well the material is piled inside until proper observation can be had, which is only when the door is open.

Handling and Removing. It naturally follows that, if the bales, boxes or cases are piled in tiers, they must be removed ready for trucking to the receiving or storage quarters. Frequently, those handling the rubber allow a case or bale to slip from their grasp, which can very easily result in injury to a helper or those standing near by. Band irons or wire are used in most instances on crude rubber cases, these causing scratches, as well as the possibility of a band iron coming loose, exposing the nails, and punctures and other wounds are the result.

As these cases and bales of rubber are usually handled by hand up to the point of trucking, sometimes strains from heavy lifting are also the result. Sharp hooks, similar to hay hooks, are also used for handling bales and cases. These must be handled carefully to avoid injury, as sometimes occurs when hooks slip from a bale or case. Hooks should not be left on floor where they can be stepped on.

Care should be exercised in taking down the crates to prevent the toppling or dislodging of them and the possibility of crushed feet or

hands. In pushing the crates over, workmen should always stand clear of the cases or bales to avoid injuries. Where trucks are used, good four-wheeled flat trucks are generally best. These should be of sufficient width to keep the cases or material well within the truck body, allowing no over-hang. Material, in no instance, should be piled too high, and it is well to secure the cases where they do not rest absolutely flat on the truck.

Trucking and Conveying. After the car is opened and the material examined, it usually follows that the cases and bales are trucked or conveyed to the Receiving Department or storage warehouse, and bales, cases, etc., are knocked off the trucks, with the result of crushed feet or other injuries. Where material is conveyed mechanically, the same is the result, unless proper safeguards are provided to prevent the falling of material.

Gangplanks, skids, chutes and conveyors are frequently used in trucking and conveying. A very good type of gangplank or run-board consists of a series of 2x4's of oak, ash or wood of equal strength, usually about four feet in length, with 2x6 top and bottom supports, bolted together and riveted, the design of which can be secured from the Millers Mutual Casualty Insurance Company of Chicago.

There are a number of well-designed safety run-boards which may be secured from various commercial safety supply houses. It is essential in any case that the run-board be sufficiently well designed to withstand the load for which it is intended, be securely anchored to prevent slipping off the car or platform, to have side rails or members to prevent truck running off run-board, and, as far as possible, to prevent slipping. It is also well to consider drainage of water and ice accumulation.

Piling. After the material is conveyed to its destination, it is usually the custom to pile it in an orderly fashion, and, if improperly piled, the cases and bales are apt to become dislodged and cause those standing or working near by serious injury. Sufficient aisle space should be allowed for ready access or removal. Material should not be piled too high, as this results in dislodging or strains in lifting, and, in some instances, makes it exceedingly difficult to get the material out.

Opening Crates and Cartons. Hand leathers or gloves should be worn to open crates and to prevent injuries to the hands from nails, band irons, etc. Good, substantial shoes should be worn in place of "sneakers" and old wornout ones. Reasonable working area should be provided so that employees will not strike each other with axes, hatchets, knives or hand tools. It is well to wear goggles when opening crates to prevent dust and splinters from entering the eyes. Work tools should not be left lying around the floors where they can be tripped over and knocked down to cause injury. Obviously, they should be kept in good condition, free from burs and cracked handles, and sufficiently sharp to execute the work without unnecessary labor which sometimes results in accidents.

Separating and Cutting Up. In most instances, the rubber is received in sheets or in bales which are made up of a series of layers or sheets. In the case of plantation rubber, these are smoked and dried, with the

consequence that the layers adhere to one another and must be separated when ready for use. Long, sharp knives, cleavers, canthooks and wedges are used in separating and cutting up rubber sheets, and, in the case of wild rubber, usually knives or mechanical cutters are employed. In some instances, mechanical separators are used for sheets and bales of plantation rubber.

The usual injuries are cuts and bruises, although where mechanical appliances are used such as power-driven winches or drums, more serious injuries can result, such as fractures. Layers or sheets must be carefully handled when cutting the rubber with knives or cleavers, as the rubber is tough, yet elastic, and the knives often slip. It usually requires more than one man, and the work must necessarily be speedily done.

Knives and cleavers should be kept in good condition and knife holsters used wherever possible. Floors should be roughed to prevent slipping, and sufficient working area allowed to prevent congestion. Where mechanical separators and hooks are used, care should be exercised at the time of making the hooks in the sheets and when the sheets are separated and the power interrupted, so that the hooks do not slide or fly off. In the case of wild rubber, it is important that any mechanical cutters be thoroughly guarded and, where rotating knives or mechanical knives are used, that knife points be guarded or the operators be kept as far from the knives as possible, preferably by a mechanical feed.

Removing Refuse. After the cases are opened, nails, band wire, burlap and wood splinters are left about the floor, and contact with this refuse may cause punctures, cuts and bruises. In removing the refuse, care should be exercised to prevent stepping in nails, band irons, wires and wood splinters, and splinters from entering the hands. Gloves should also be worn on this operation, and material left on the floor should be cleaned up sufficiently often or brushed to one side to prevent such injuries.

Soaking and Washing. Where wild rubber is used, it is usually necessary to soak this rubber in soaking tanks or steam baths, and, after the soaking process, the rubber is usually washed between corrugated rolls upon which water is sprayed at the time of the washing. The tanks are made of either steel or wood and supplied with hot water or steam. The injuries that result from these operations are usually burns.

The injuries from washers are usually serious, being even more dangerous than the ordinary mill, due to the fact that the rolls are fluted, and the operator usually works in water and on floors or gratings which are usually wet and slippery—it being very difficult to prevent the water from splashing or dripping where men are obliged to stand. Some injuries result from slipping on the floors and from bumps and bruises in handling the material itself.

In soaking the wild rubbers, rubber should be lowered into the soaking tank gently to prevent the splashing of the hot water. It is always well to provide an overflow approximately one foot from the top of the tank to prevent the water from overflowing on the feet of the workmen. Where steam baths are used in connection with the water soaking

process, a positive regulator should be supplied to prevent scalding or "shooting." Positive regulating devices may be secured from various commercial firms for this purpose.

Great care should be used in placing the rubber in the washer for breaking down and washing. Operators should wear no loose clothing, such as long neckties, loose or baggy sleeves or aprons which may be caught in the rolls. Where it is practicable, a shelf should be provided for breaking down upon which the rubber can be placed and shelved into the washing mill, rather than allowing the operator to force it in with his hands. Frequently, rubber rides on the rolls, and a uniform stick or wedge should be used in all cases to hold the rubber down. Guard rails should be used wherever it is possible to do so to keep the operator away from the mill so that he may not reach over into the bite of the rolls, and, as soon as the material is sufficiently sheeted, a shovel should be used wherever it is possible to do so.

Operators should watch their hands where it is necessary to work with the sheets under water, such as tube washers, and they should be thoroughly instructed that, in no instance, are they to reach in the washer mill for a knife or any object which may drop into it.

All gears, couplings, keyways, spokes, pinions, flywheels, shafting, shaft ends and revolving projecting parts should be guarded. Safety stops and power cutoffs should also be provided for these machines. A throwout bar should be above the rolls immediately within reach of the operator, and this throwout should be used as a service stop in order to make the operator as familiar with it as possible. Roll travel after safety is thrown should be as low as possible; general practice is about 8 inches of the periphery of the rolls with mill loaded. The rolls of the washer mill should be as high from the floor as is practicable. All electrical wiring, either for starting or lighting, or in connection with the safety stop, should be in conduit and thoroughly grounded.

Railings should also be provided for enclosing all moving parts from too ready an access. Starting panels should also be thoroughly enclosed, insulated and grounded. It is well to provide warning signs for both the mills and starting panels. Usually an opening in the housing on the operating side of the mill leaves a possibility for a piece of a safety cap to strike the operator. As these safety caps are necessary to protect the rolls from breakage, a guard should be supplied over the opening in the housing, which can be removed for access. The adjusting screws should be frequently inspected. It has been found good practice to lubricate these with kerosene about once a week to keep them in working order.

A jack or pinch bar for spreading the rolls apart in case a workman is caught should be provided for any group of mill washers the same as for mills, preferably in an individual cabinet, so that they can be readily found when necessary. Proper drainage should be supplied to the shelves, floors and pans of the washer mills to prevent undue collection of moisture on the floors, and rubber mats, properly secured, mastic or composition flooring, or equally effective material should be used in front of the washer mills, owing to the fact that the floors sometimes become

slippery. Injuries on washer mills may be avoided the same as on other mills by properly instructing the operators and providing the necessary safeguards.

CORES AND MOLDS

Design and Machining—Cores and molds should be designed so they can be hoisted and handled to a reasonable degree with safety. Proper thicknesses and weights of metals must be allowed for lugs and rings, and the shapes for lifting strength should be such as to allow for a reasonable factor of safety. Sharp corners should be eliminated wherever possible, so long as it does not interfere with the manufacture of the rubber goods. A radius should be provided on all tire molds to eliminate the sharp corners and reduce the weight where it is not needed.

Substantial grooves should be allowed in the cores of tire molds so that the pin can be well seated and collapsible cores should have the rings extend in, in order to hold well to the groove. Bolts should be secure on all collapsible cores and carefully fitted. Uniform clearances should be provided between prying lugs of all sizes. It is equally important that the bars be carefully designed to insure correct shape and leverage.

Trucking and Conveying—Many injuries result from trucking and conveying of molds and cores. There are many types of transportation equipment, many of which are designed by the various rubber manufacturers themselves, and others are commercial devices. Flat trucks, lift trucks, pin trucks, tractors, conveying machinery of all description are undoubtedly used in one plant or another. The most serious injuries are crushed feet, resulting in fractures or loss of a member, contusions, lacerations, and many others too numerous to mention.

Substantial transportation equipment should be provided. However, each manufacturer has undoubtedly adapted the type of trucks, conveyors and equipment to that best suited for his own use. Many injuries result from cores and molds handled on trucks. Frequently, cores and molds are piled on flat trucks, one core or mold on another. This is particularly dangerous in the transportation of cores, as these are rounded and are very apt to slide off. Usually, a four-wheeled truck is employed with a standard in the center of either a heavy casting or pipe with two horizontal members, all of which are in the form of a "T," the two horizontal members having a collar or pin at each end.

The cores, or the cores and tires, are sometimes suspended from these stakes and trucked to and from the various operations. The design of these trucks must be such as to withstand the heavy loads to which they are subjected both from a point of weight and the jar in placing them on the stakes and taking them off. It is best to use a four-wheeled truck for this type of core, the front axle being pivoted, in order to be able to turn around with the truck. It sometimes occurs that trucks become top heavy in turning and are overturned. This can be avoided by means of

flat, iron legs immediately adjacent to the front wheel and bolted rigidly to the bottom or side of the truck, giving a clearance of about one inch from the bottom of the leg to the ground.

Falling over truck handles is the cause of many accidents. Some handles are designed so that the truck handle may rest in a vertical position when the trucker has placed his truck at its destination or leaves the truck for some reason or other. Others can be removed entirely, if necessary, without unbolting, and are arranged with a slot fitting in a cross member and set in a vertical position when raised and allowed to drop down. Tractors and trailers are also used and, in most instances, the same type of truck is used with a coupling, instead of a handle. Sometimes truck handles are painted with alternate stripes of black and white to make them as visible as possible. Workmen should secure assistance when handling trucks and loads on inclines.

Conveyors are used in many plants. In any case where conveyors are used, gears, shafts, bolts, pulleys, motors, sheaves, cleats, cables or moving objects which are exposed to contact should be thoroughly guarded, and, in cases where employees are obliged to pass under such conveyors and where cores or molds are liable to drop off, heavy and substantial guards should be provided to withstand the weight and force of these objects and prevent them from dropping below. Positive signaling devices should also be provided at the loading and receiving end. In some instances, a speaking tube is used in addition. A means of disengaging all conveyors from their source of power is also necessary.

Piling and Racking—The same condition prevails with regard to injuries in these particular operations. Molds and cores are sometimes piled flat; others are piled on edge; still others are racked on edge; or miscellaneous size cores and molds are sometimes piled in bins, all depending on the type of core or mold and the method the various manufacturers employ. These are very frequently moved and handled the finished product.

Molds and cores should be properly piled. When they are stored, great care should be used to see that the floors are not overloaded. Molds should be piled flat and not too high. This is mainly governed by their weight and means of piling at hand. Sometimes cores are piled one upon another, but this is not good practice, for the reason that the cores are rounded and are very apt to slide off. In some instances, cores are set on end, and care should be used to see that the proper angle is maintained to prevent slipping of the various cores from vibration or contact. A rubber mat or individual racks can be used to good advantage in keeping cores in an upright position. This is usually the safest way. Sometimes cleats are used on the floor. Where cores are elevated in racks, great care should be used to see that a cleat or stop is used so that the core cannot roll off.

Lifting—Lifting molds and cores involves quite a hazard particularly owing to the variation in weights of cores and molds and the peculiar shapes of them. Many of them are bulky, yet are not heavy, while others are extremely heavy and require more than one man for lifting.

In tire operations, the cores and molds are very frequently lifted either manually or mechanically; consequently, the injuries from this source are not only numerous but quite serious in many instances.

Molds are seldom lifted by hand, particularly because of their excessive weight and awkwardness in handling, and, in the majority of cases, chain falls are used for this work, although mechanical devices, such as conveyors, trolleys, cranes, air hoists, etc., are used. The smaller size cores are usually lifted without much difficulty, but it is considered much safer for two men to lift the larger size cores.

Where cores are lifted and carried by two men, accidents are often caused by one man walking backward. Where space permits, the core should be handled by the men both facing forward, each to the side of the core. Cores should never be carried over the neck and, even where a core is carried by one man, he should never walk backward. If cores are left fall to the floor, which relieves considerable lifting, pads of various materials for cushioning effects are used to good advantage. These should be so constructed that the bounce will not be so great that the cores will bounce off and over-balance. Where cores are suspended from chain falls, trolleys, etc., and moved, they should not be pulled with a core behind the operator, but rather should be pushed in front, as there is a possibility of the core becoming disengaged from the hook or device used to hold it suspended and falling on the foot or person of the operator.

Rolling—Many of the smaller plants and even the large ones roll cores and molds by hand to and from the different working places within rooms, particularly in the smaller plants where conveying machinery is not in use. This, of course, involves a serious hazard, particularly with the heavier objects and peculiar design which is necessary. Owing to the fact that cores are rounded and polished, it is exceedingly dangerous to roll more than two cores at a time, especially odd sizes. Uneven and smooth floors are the cause of cores getting away and numerous foot injuries, especially in rolling.

Cementing, Cleaning and Brushing—These operations involve both accident and health hazards, mainly slippery cores producing bruises, contusions and fractures, cores frequently getting away from the grasp of the workmen, and the vapors given off from various cements are sometimes toxic to certain individuals. In the cleaning and brushing operations, and various methods used, such as wire brushing, sand papering, lead baths, oxygen torches, shot and sand blasting, it follows that the material must be handled either manually or mechanically, and the same danger results from the lack of care in handling and the conditions under which the operators are obliged to work, including equipment involved.

Care should be exercised to prevent cores slipping in handling after they are cemented. Goggles should be worn for brushing and cleaning operations, especially where compressed air is used. Ventilation should be supplied in all cases where there is an abundance of dust or fine par-

ticles from cleaning and brushing molds. Where mold burning is done, it is well to ventilate the equipment at the point of operation to remove the fumes. This is also true of lead baths and cementing.

Brushing molds is usually a manual operation. In some plants, however, mechanical brushing devices are employed. In either case, it is necessary to handle the molds, or at least the lids of the molds. These result in numerous injuries to the fingers and hands and, frequently, strains from hand lifting.

Removing from Molds—This requires strong, robust men, if done manually, in order to avoid strains, as it is considered quite heavy work for the larger size molds. The balance construction and tension of bars and equipment, are important. Men should provide themselves with good, substantial shoes and the floor and working area should be such as to give them the best footing possible, in order to avoid slippage. It is also important that ample working space be provided so that they are not unduly crowded in the course of their work.

Assembling and Unlocking—Assembling and unlocking cores and molds consist mainly of operations whereby a segmental core is assembled or unlocked or the lid of a mold is removed from the lower section from the material to be molded between. This, particularly in the assembling or unlocking of segmental cores, causes injuries to the hands and feet, sections of the cores getting away from operators or getting fingers pinched between the different members of the cores. This is also true of the lids, where fingers are frequently pinched and often severed in either assembling or unlocking.

Segmental cores should be carefully assembled and unlocked. Segments of cores have a sharp edge at the point where the two sections come together to make a perfect radius and, if dropped, are liable to sever a toe or cause serious foot injuries. If dropped on the hands, the injuries are usually serious, and they should be very carefully assembled and made tight.

Stripping and Finishing—Tires and certain other rubber goods are stripped from the cores. Some plants do this manually on some operations, while others employ mechanical devices. As a rule, the manual operations involve the greatest hazards, which are mainly strains, bruises and falls, also from handling the various tools. Slipping is also an important cause factor as related to these operations. In finishing, the work is usually done by hand. Some lifting is done, which causes strains and fractures, if the operators are unable to hold the cores, or attempt to lift or move cores without the help of another workman.

Good, substantial shoes should be worn, preferably with arch supports, and great care should be exercised when stripping by hand so that the tools do not slip off and fly, striking the operators. Segmental cores should be carefully piled, when taken apart to avoid contusions and lacerations, and, wherever possible, substantial hand protectors should be worn. Gratings should be provided where floors are wet and where soap is used, and proper drainage to take away any excess moisture. Even dry floors should be roughed or treated to eliminate the glaze.

Rubber mats may be used, if secured; however, mastic flooring or composition is excellent for this purpose. Spinning tires on the spider warrants very close attention, and it is well to keep the hands and arms away from the carrying arm, to avoid getting them pinched between.

Placing in Chuck—(Machining and Finishing)—The hazards involved at this point often result in crushed feet or badly bruised hands. Accidents result from tire finishers placing cores on the pins in a haphazard manner. The core should be securely spotted on the chuck on both the building machines and finishing stands, carefully observing that they are spotted in the grooves and turned up securely. It is well for the operators to try them to see that they are secure. It necessarily follows that a proper maintenance should be provided to see that the grooves do not become sufficiently worn to release the core from the chuck and that the screw and hand wheel are also kept in good repair.

Painting—No serious hazards are involved in this operation. Frequently, however, small amounts of paint are splashed into the eyes. Solution for painting should be carefully applied to avoid splashing in eyes. Mechanical painters are used in some plants which lessens this hazard, and other plants undoubtedly require operators to wear goggles.

Moving Cores on Supporting Hangers or Hooks—This operation results in various injuries to the hands and feet usually quite serious. In some plants, the cores are placed on trucks with supporting "T" arms, both before and after the tire is finished and ready for curing. Often the hands are crushed between the cores or between the pin and core or the collar or stop.

When placing cores on stake trucks, care must be used to see that fingers and hands are not caught under the cores being placed on the stake. Likewise, the fingers and hands should be kept free from the stop pins and collars, or mashed fingers and hands usually result. The tire trucks most generally in use have a collar or pin provided at the end of the stake to prevent cores and tires from sliding or falling off. Frequently, the trucks are suddenly swung about and, if the stake is not loaded full, the cores swing and shift about. Operators should keep free from the cores when truck is in motion.

Opening and Removing Mold Covers—This operation is also done either manually or mechanically according to the various equipment and methods of the various rubber manufacturers, and, if proper care is not exercised, this results in injuries to the fingers, hands and the arms, and also in crushed feet.

Various methods are used in opening and removing mold covers, some with hand tools, others with hoists, hooks, conveyors and hydraulic rams. In any case, the covers must be properly balanced and securely fastened to prevent dropping on the feet or person of the workmen. If carried overhead, when removed, strong barriers and guards should be provided when workmen are obliged to pass underneath or in front of them.

Molds should be secure on hangers or spreaders to prevent their falling off. If moved manually, they should be pushed and not pulled so that, in the event of mold by any chance coming off of hangers or spreaders,

the workman will be able to observe it with an opportunity at least of protecting himself. When lifting molds, sometimes operators carelessly fasten hangers or spreaders to upper half, instead of lower half, depending on the tire in the mold to hold lid and mold together.

Placing Mold Covers—This operation is likewise done either mechanically or manually, depending on the type and weight of the covers and molds, but is usually done mechanically by means of hoists, and careless or thoughtless acts usually result in crushed fingers. Injuries to hands, fingers and arms, and sometimes injuries to the head, may be avoided if covers of molds are carefully placed over the bottom section.

This is frequently the result of getting fingers or hands between the upper and lower sections of the mold, and also at the time when the green tire is being placed in the mold for curing. Where the lid or cover is suspended overhead from conveyor or other mechanical apparatus, care should be taken so that operator does not get underneath the lid, in case it should become dislodged from movement of the lid or cover, or the possibility of the mold cover striking him in the head from swinging of the mold. The covers should be carefully balanced and, when released, the operator should stand clear to avoid the possibility of the covers becoming dislodged and falling on the feet.

Hand Tools and Fixtures—Many hand tools and fixtures are employed in connection with the use of cores and molds. These are usually adapted by the manufacturer to the equipment which is best suited for the construction of rubber goods. A number of the hand tools are prying bars, pulling bars, wedges, hammers, rollers, soapers and brushes, all of which constitute a hazard because of their frequent handling. Some of these are subjected to much abuse and often fail.

Hand leathers or gloves should be worn to prevent burns. Leather should be as tough and heat-resisting as is possible. As mentioned in previous paragraphs, the hand tools should be designed of high-grade material with a reasonable safety factor to prevent over-stressing of the tools, also as to shape and leverage, in order to avoid strains from lifting, pushing or pulling, and reduce fatigue as far as is possible. It is equally essential that these hand tools be properly maintained and never used unless they are in a satisfactory condition.

ROLLS AND FABRIC

Receiving—Rolls and fabric are usually received in box cars, and it is possible for injuries to result from improper piling, faulty doors and condition of cars. These usually result in broken bones, mashed feet and fingers, and are sometimes serious.

In receiving rolls and fabric, it is well to see that the doors, brakes and cars are in good condition, in order to avoid the possibility of a door striking the workmen, or the result of a door becoming dislodged from opening. The same care should be used as in the foregoing paragraphs relating to receiving of other materials, in order to avoid this type of injury.

Unloading—Unloading rolls and fabric involves removing the rolls and usually taking them to storage in the warehouse or direct to the production departments, according to the various methods of the manufacturers. The usual injuries from handling this type of material are similar to the ones in the foregoing paragraph, and are due to handling and equipment used in connection with the unloading.

Many of these rolls are bulky and difficult to handle—varying in weight from 150 to 1,200 pounds in some instances. According to the piling in the cars, it is well to be sure that no one is below when letting them off the piles, and the same care must be exercised in lifting as found in the foregoing paragraphs as other material. Strains can be avoided from proper lifting and by using mechanical lifters or devices in place of manual labor.

Trucking and Conveying—Accidents from this source are rather numerous and sometimes serious when large amounts of goods are received. These injuries are somewhat similar to the ones in the foregoing paragraphs, as much handling is necessary in the trucking and conveying problems. Manual and mechanical devices are used, which constitute hazards in themselves. The majority of these accidents may be avoided by personal instruction, care and safe mechanical apparatus.

The rolls are usually trucked and conveyed to the weighing division and thence to the receiving and warehousing departments, flat trucks, lift trucks, tractors, conveying machinery being used for transportation. Care should be used to see that all the mechanical equipment is thoroughly guarded and that the hand trucks are sufficiently strong to withstand the loads to which they are to be subjected. They should be arranged with a sufficiently wide spread so that they will not over-turn.

Maintenance of these trucks should be such as to afford maximum protection, as many injuries result from improper maintenance of what is termed splendid equipment when first put into use. Where elevators are used for conveying, care should be used so that the lifting capacity of the elevator is not exceeded and that trucks are secure on the platforms to avoid running into the shaftways or gates. Rolls should not be piled too high and should be anchored to prevent sliding or rolling.

Weighing—In most plants, it is the usual custom to weigh in the rolls and fabric over a scale after they are received. There are no serious hazards in the connection, if the handling is carefully done, the equipment substantial, and proper aiseways provided; also, if the proper care is exercised in spotting on the scale and giving the necessary attention to the anchoring of the material itself. It necessarily follows that the aiseways must be unobstructed and that observation is sufficient at corners for traffic coming in both directions.

Storage—In storing rolls and fabric, it is usually customary to place lengths of various size timber on the floor upon which the rolls and fabric are placed. These are also placed one on another with the possibility of their becoming dislodged, unless they are very carefully piled.

which sometimes results in quite serious accidents. It is good practice to use cleats at the end of each section of timber for the upper tiers, and sufficient aisleway should be allowed for access.

There are various lifting or hoisting devices for reducing accidents. These are usually chain hoists, tiering machines or conveyors. It is quite essential, where tiering machines are used, that all the exposed gears, sheaves, cables, hinges, pulleys, belts, shafts, keys, keyways, etc., are always satisfactorily guarded. On some of the types of standard tiering machines serious injuries have resulted to the hands of the operators from the guides and sheaves. In the hand operated types, where there are intermeshing gears, it is well to see that these gears are thoroughly guarded, as usually when the platform of the machine is released, these revolve at a high rate of speed. Rolls should be secure on the platforms to avoid rolling off, and the machines should be placed sufficiently close to the piling operations so they cannot drop between. Where hoists or cranes are used, it is well to arrange for periodical inspection of the hooks, slings or other apparatus, as in many cases these have failed at a critical moment.

Inspecting and Stamping—Inspection, as a rule, consists of passing the fabric over an illuminated plate and sometimes over a series of rolls for inspection and stamping. There are no serious hazards in this connection, with the exception of the handling of the rolls themselves and eye strain from improper illumination.

Attention should be given where the inspection machines with an illuminated glass panel are used, that proper lighting is provided. Eye strain and fatigue can easily result from this operation, because of the constantly moving fabric and the close observance necessary. All gears, belts, pulleys and moving parts should be thoroughly and substantially guarded, and care should be used in lifting and handling the rolls.

Drying and Re-Rolling—Sometimes fabric is passed through a drier, which is usually a mechanical machine, consisting of a drive mechanism for pulling the fabric over drums or steam coils. These drums are usually constructed of boiler plate sufficient to withstand reasonable steam pressure, according to the operation for which they are to be used. The hazards from this operation may be from belts, pulleys, gears and interturning rolls and from handling and rehandling and burns.

Rolls, where dried mechanically, both passing over coils or drums, sometimes result in injuries which can be avoided by strict observance as to the type and design of the machine itself, making sure that all moving parts are thoroughly guarded, hot steam piping insulated, as well as any other portion of the frame or machine which can be consistently covered. Attention should be given to any series of rolls which come together, or turn in drawing the fabric between, so that the bite can be protected with a satisfactory guard to prevent employees' hands or arms being drawn between. A device for disconnecting the machine from its source of power, in addition to a brake, if the momentum is great, should be supplied immediately within reach of the operators. The rolls, when

placed on hangers or stirrups involve hazards, such as crushed fingers, bruises and abrasions and strains from lifting. Ordinarily, care will eliminate most of these, while proper mechanical arrangement may avoid others.

Calendering—The usual accidents are from crushed fingers, hands and arms, burns, shocks, bruises and contusions. Some injuries are the result of shells and bars left standing on end and being knocked down. Others are the result of slippery floors, poor lighting, etc.

Calenders usually consist of three driven cast-iron heated rolls, between which rubber is passed, sometimes straight or impregnated in the fabric. All moving parts, such as gears, keys, shafts, couplings, etc., should be thoroughly enclosed or covered and a safety throwout provided at working points about the calender to bring the calender to rest as quickly as possible in case of accidents. In most cases, mechanical or electrically governed brakes of various types are necessary. In others, dynamic braking may be used to good advantage. In some operations, guards may be used at the point of the intermeshing rolls, while in others they cannot. Operators must be alert and careful in passing the fabric through the calender in any case. It is well to keep the hands six inches from the end of the fabric. Leaders or stiffeners are used to good advantage by some manufacturers to assist the operators in passing the fabric through the rolls.

The fabric is usually suspended from brackets on the housing and placed in a stirrup or bracket with a ring and a spindle. These should be supplied with positive locks so that the rolls cannot slip out and fall on the operator's feet. Shells and bars upon which the fabric is wound should be laid flat on the floor or otherwise secured so they do not fall on the operators. Many calenders have raising and lowering devices, either for hand operation or mechanical. It is well to have means of quickly releasing the injured, avoiding reversing of the rolls until they have been separated to a point where the member will not be crushed again, usually resulting in amputation.

Safety throwouts are usually across the frame of the machine both front and rear, and in some cases, immediately at the point of windups. These may be mechanical or electro mechanical, usually running to a clutch or to a disengaging switch. The details of construction are included in the Safe Practices Pamphlet, covering mills and calenders, and details as to the best type of construction and devices can be had from this pamphlet.

Delivering—The usual custom is to remove this stock on hand trucks, lift trucks, conveyors, or elevators. This involves the usual hazards as mentioned in the foregoing paragraphs, and the best methods of avoiding such hazards are proper mechanical equipment, using flat trucks where the material may be properly secured on the truck. Elevators and their appurtenances should be of the safest type. The lifting capacity of the elevators should not be exceeded. Loads should be properly spotted, and care used in running off and on the elevators. Care should

also be used in running down inclines and in placing rolls so they will not topple over. If possible, it is best to hang them in racks as this avoids the possibility of their falling over and also assists in any material damage to the rolls themselves.

EXAMINATION OF EMPLOYEES FROM THE STAND-POINT OF OCCUPATIONS IN THE RUBBER INDUSTRY

R. S. QUIMBY, M.D., HOOD RUBBER COMPANY, WATERTOWN, MASS.

There are several rather distinct divisions in the health program as it may be carried out today in almost any industrial plant. The rubber industry is not notably peculiar unto itself. The general medical program for the industry covers the story in the rubber industry as well as any other industry. However, there are several rather distinct factors on the health program of the rubber industry.

First, there is the physical examination.

Second, there is the dispensary treatment of various abnormal sickness and accidents during hours of employment or work.

Third, there are disability cases followed throughout the disability into the home or hospital, as the case may be, usually by the services of nurses, supplemented by the services of physicians.

Fourth, there is a general health supervision of the plant. In spite of the work of safety men in spite of the work of others in the management, there is still a condition on which the physician should be better able to advise on and perhaps control, than anyone else. So, the fourth function is supervision of general health—sanitation, hygiene of working conditions in the plant, and others which I will touch on a little later, such as relationship of beneficial plans of compensation.

What do we mean when we say physical examination in industry? You think, most naturally, of the type of examination you had when you were seeking to take out life insurance, or you have in mind the examination given by the Life Extension Institute, or in a few cases, you are in the habit of going to your own private physician as a matter of routine.

That is not the type of examination we visualize when we speak of the ordinary run of physical examinations in industry. I think that I might liken our general examinations to the coarse sieve procedure. We are trying to sift out the coarser conditions, the most important conditions. We are letting pass through the sieve more or less conditions which may in time become of importance which we can't hope to catch in their entirety at the time of the original examination of the applicant. There are several elements that contribute to the necessity of a coarse sieve rather than a fine sieve at that time. The time element is one and quite important where the employment department wants whatever is going to be done done quickly and a man not held up. While we have entered into a contract with the man, yet, on the other hand, pure decency alone prompts us not to keep him more than two or three hours.

The time element is important in industry. We say the examination can be done in from five to ten minutes. Of course that doesn't mean all the cases can be done that way. I am talking of the 80 or 90 per cent majority. No one can criticise the expenditure of 10 minutes of time.

It may seem to you that very little worth while can be discovered in the course of such examination. However, those men come to the doctor prepared for the examination. In most cases the man is already stripped to the waist and preliminary information has been gathered and already is on the card, when the man comes through, so there is no waste time there. A doctor, trained reasonably in routine physical examination work and having a fairly good knowledge of the occupations of the plant, can visualize fairly accurately whether the man being hired is fitted to the work physically and can do a whale of a lot in 10 minutes. A great many serious conditions are perfectly obvious to you or anyone not necessarily medically trained. It doesn't take long to run over the eyes, the hearing, look over the nose and throat, sound the chest, the heart and lungs, the abdomen; whether or not the applicant has varicose veins and flat feet. The questions the doctor asks as he is going along give a brief history as to what illnesses the applicant may have had, etc.

DEVELOPMENT OF THE PHYSICAL EXAMINATION

There have been a great many thousands of examinations that follow that general procedure, in most industrial plants today.

I think it might be well to touch a bit on the history of this whole question and its development. It is not so many years ago that physical examination in industry was unknown or at least, limited to public utilities or unusual cases. We see every day even now, industries which have not taken up physical examination work and are very apprehensive of starting it. They don't see the motive in it. Not only that, but they are afraid to start it. They are afraid of reaction of the employees toward it; that they will say "What right have you to make me submit to an examination? We will walk out if you force our hand."

The history of the situation has been that that thing doesn't happen if it is done with an intelligent degree of decency. The condition can be brought about, but it is absolutely unnecessary to stir up turmoil. I don't know offhand how many companies are doing physical examination work, but I have yet to hear of any serious condition where it has been done with any degree of intelligence, of an uprising among the employees.

I think it is vital that your management be sold the idea before any doctor starts out to do it. Until such time as sound belief is established, the matter should be held in abeyance, but once agreed upon, go ahead in a reasonable way. I think the best place to start, after once you have sold the idea to the management, is with the older employees and gradually go through the rest of the employed force.

What do we seek to do by examining a man who comes in looking for a job? We seek first to keep out such individuals as are unfitted for employment in our plant. How many such are there? That percentage

will depend on how you classify those unfitted and how strict your own standards are in that question of elimination. That is a controversial question brought up frequently to stigmatize our efforts: Are you going to throw them out of employment on to society? That burden is already on society and always is going to be there? If we stick to the standards as fixed by the Conference Board of Physicians, we can always justify our position of rejections. Men are only rejected because employment would be a menace to themselves, to their fellow-employees or to the property. Then in the case of contagious diseases—tuberculosis—we have no right to expose other healthy individuals who may be in our employ, to this danger.

On that basis, you reject certain cases. The general experience is about four per cent to six per cent varying with the particular industry and the standards of a given plant. I think of course in Army rejections it runs up to 33 per cent, among the selective age group.

We make no wholesale rejection, neither do we find it necessary to make wholesale rejection. A great many of these people can be adapted to selected occupations where they can be perfectly good producers both for themselves and for their employer.

HEALTH HAZARDS OF RUBBER INDUSTRY

Now then, you have a question of your people exposed to hazards in the rubber industry. What are those hazards? The chemical hazards, as you well know, are hexatetramin, urotropin and benzol. Those, I think, are the three outstanding.

Then you have the question of your physical hazards outside of your chemical hazards, such as heavy lifting, tire making, maintenance jobs, mixing room jobs, etc. Those are not so much different in the rubber factory than in any other factory. There are heavy jobs in any industry; it doesn't make much difference whether it is a bag of cement, a load of rubber or a wheelbarrow of bricks. So, from the physical standpoint, the question of occupation is not vital in the rubber industry.

Another important factor is the factor of female employment. What are you going to do with these women? As far as the physical examination is concerned, I have always felt that it was only fair and decent that we should furnish a female examiner. In the dispensary, it isn't important whether the doctor is male or female, but on the question of examination, I think it is fair and decent and proper to have a female examiner. I think they resent it much less. So we do that. Now, the examination need not be as detailed with the girls as with the men because in the first place, they are not going to be doing as heavy work and they are not subject to certain conditions which exist in the male employment, particularly hernia. Hernia in females is rare and the industrial liability practically negligible.

I think in the case of females we should make that examination rather superficial except in cases where more details are indicated to be necessary.

As to examination with reference to your chemical hazard, I do not know, neither do I know anyone who does know what we can do specifically to prevent the difficulty from lead, benzol or hexatetramine poisoning, aside from exercising our general judgment as we do in other occupations to try to put individuals without serious physical defects where they are exposed to lead, benzol or hexatetramine poisoning. But beyond that, it is a matter of watching and reexamination to determine what individuals are susceptible or, perhaps, that individuals exposed in a greater degree, develop a peculiar condition.

As I say, the management is where your drive should be made most intensely, in connection with any of this health work. So we should double our efforts among the management to sell this medical work and physical examination work and reexamination to prevent the development of insidious conditions. We are doing everything to avoid the development of serious consequences.

The first thing you do after establishing a physical examiner in your plant, is to keep from your employment office a certain number of people who know, themselves, they are unfitted for the work. There is the first big preventative step right there. You will find very roughly (it will depend considerably on the individual equation of how your doctor who rates people, standardizes) that may run to 40 or 60 per cent, more or less.

We have heard a lot about pyorrhea and root abscesses. The idea is right; those dental facts deserve consideration. The thing should be carried down to a point of correction. The dental dispensary (with outside dental service next) I believe you will find a matter of 10 or 12 per cent.

DEFECTS AND THEIR PERCENTAGE OF OCCURRENCE

The gross eye defects, mostly in your clerical and footwear divisions and your tire division, from five to seven per cent.

Figures will run on hernia among men, I think, about five to seven per cent. This covers cases that are going to be controversial and that you ought to know about when they come in.

You will find about two per cent gross circulatory defects, heart defects, (not organic and not necessarily to be excluded from your employ) and about the same percentage of lung conditions, some tubercular and some not tubercular. Some can be employed and others not.

We should of course seek to follow those defective findings through to their correction in our medical department or outside, if we are going to build as strong as we can on a constructive health basis.

A great deal of money can be saved by the work of your own medical department both in connection with examinations, treatment and the handling of your compensation cases. A certain number of them may from force of necessity or apparent desirability, go to outside surgeons or outside hospitals.

It may be desirable to have a beneficial arrangement so that people disabled may be tided over their disability, but don't do anything to invite them to put it over on you. If they put it over on you in benefits, they will put it over on you in something else.

Our experience over a period of five years indicates five per cent of our working time is lost because of personal reasons; our total absences are about five per cent of the working time. Six days of the working year are being lost on account of sickness and non-industrial accident. That figure of six days of a working year is relatively low, with 35 or 40 per cent female employment.

I wish in connection with Mr. Lyons' report something might be done as is being done in the Public Health Service. I happen to be chairman of the Committee of Industrial Physicians and Surgeons' organization. They are making a drive towards standard methods of collecting this information and disseminating and comparing it. Get your information on the same basis and as good as your compensation basis is today. Once we have done that in the rubber industry, we have something to take to the industry and say, "Here's ours; what is yours?" It is the only yardstick by which you can measure what you are accomplishing and whether the examination is worth being made.

You can save money in connection with your insurance arrangements and your beneficial arrangements by doing it.

DISCUSSION

Mr. Hewitt: How frequently would you recommend examinations on compound mixers?

Dr. Quimby: Every three months, I think.

Mr. Schneider: I would like to know whether you carry on subsequent examinations and how often with employees continuously in employment and also whether employees are re-examined after they have been off for illness other than that occurring in the course of employment?

Dr. Quimby: I will answer your last question first. We have an arrangement whereby we follow cases out on account of sickness. As to the reexamination, we try to cover those exposed to industrial hazards every three to six months.

Mr. H. T. Martin (Fisk Rubber Co., Chicopee Falls, Mass.): I would like to ask the doctor who has final authority as to whether the man should be accepted or not, the doctor or the employment man?

Dr. Quimby: Well, the doctor; he must have it, I think. The employment man can't judge the physical conditions; it is the doctor's job, otherwise, you have no need of the doctor.

Mr. M. A. Quirk (Morgan & Wright, Detroit): Mr. Hewitt asked how often they are examined. You say every three months. Would you take a loss of ten pounds into consideration?

Dr. Quimby: Ten pounds loss in the weight of a man will attract your attention.

Mr. Quirk: I am wondering whether you would follow that closely to observe the weight. I know of some cases where they watch the weight in some departments and others they don't.

Dr. Quimby: We weigh when we hire and every time they are reexamined. We also take blood pressure and bring them up for check and classification.

Mr. Martin: Do you acquaint the foremen or assistant superintendent with a man's physical defect?

Dr. Quimby: It is a routine matter. He is acquainted only by numerals as to that man's condition. Ordinarily we endeavor to keep such information as we feel can be kept to ourselves without hurting anyone, either the man or the foreman. We intend to keep that information as confidential as we can.

Mr. Martin: What I had in mind of course, doctor, was what were the number of cases you distribute safely through judicious selection at the employment department? I have a case of mine now where a man had a hernia. During a period, when common labor was scarce, he was put on a laboring job. In this particular case, the foreman knew it and took the chance. If trouble had developed, it would have been even more serious if he hadn't known about it.

Dr. Quimby: We check up inter-department transfers pretty carefully. Some get away from us. I suppose you could make it holeproof, but it is pretty hard to. There are not such a great number of occupations that it makes such a great difference. Of course the intra-department stuff may slip up as you say, where a man is shifted from one operation to another.

FIRE HAZARDS IN CHURN AND SPREADER ROOMS

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The process of softening a rubber compound with an inflammable volatile solvent, and spreading the resulting material upon a fabric must always be attended by important hazards of fire. The property losses due to this hazard must remain as a charge upon the business until such time as progress in manufacturing methods finally results in the elimination of the use of the volatile, inflammable solvent.

Experience has resulted in the establishment of certain practices and habits in spreader and churn room operations which have reduced the dangers in these areas somewhat, but it is only when the nature of the hazard is correctly understood, and intelligent and constant effort is made to offset it, that a minimum of danger will be present.

The hazards are those of gasoline, benzine, benzole, naphtha, acetone, amyl acetate, and other solvents. Between the several solvents commonly used, no distinction should be made as to hazard. If the solvent will burn, and will evaporate at ordinary temperatures, it is a dangerous material. There may be differences in the "flash points," in the range of the explosive mixtures with air, and in the specific gravity of the

vapors of the several solvents, but with a suitable combination of circumstances, serious fires or explosions may occur in connection with the use of any of them.

In order to ignite a so-called inflammable liquid it is necessary first to change of of that liquid into vapor, mix it with air, and apply heat at some point sufficient for ignition. Thereafter the liquid burns only as it is transformed into vapor and the supply of air is needed for the combustion is maintained. If the mixture of vapor and air is intimate, and the mixture is in or near that proportion at which all the oxygen of the air will combine with all the vapor, the combustion is propagated so rapidly that an "explosion" occurs, the apparent violence of the explosion depending upon the rigidity with which the field of the combustion is confined. The application of this phenomenon is usefully made in the modern automobile engine with which we are all familiar.

In a churn room, vapors of solvents are more or less regularly given off into the air, while in a spreader room the solvents are deliberately driven off, so that it is apparent that combustible for explosive mixtures of vapor and air must be present constantly or at more or less frequent intervals. With such conditions it is only necessary to introduce the igniting agency to have fire or explosion result. That such a result occurs as infrequently as it does, is a constant source of surprise, for mixtures as low as .7 of one per cent of gasoline vapor to air may burn, and such feeble sources of heat as a static discharge from the human body may be sufficient for ignition.

The problem of securing safety from fire in areas where inflammable vapors are or may be present at once resolves itself into three parts:

First, the isolation and covering of the main bodies of inflammable liquids or mixtures so that large quantities will not be exposed to fire.

Second, the prevention of evaporation at such stages of the processes in which it is unnecessary, and the prevention of the formation of combustible vapor and air mixtures in so far as possible at other stages of the operations.

Third, the elimination of all possible sources of heat likely to cause ignition.

SAFE STORAGE OF SOLVENTS

It is general practice nowadays to store gasoline and similar solvents in underground tanks away from buildings, and there are well established underwriters' rules and state or municipal laws which regulate the conditions of such storage. Familiarity with gasoline however, breeds contempt of its hazards with certain types of people, while ignorance of the proper methods of safeguarding storage leads others to err. Both factors lead to the existence of undesirable conditions in many cases. Among the undesirable conditions frequently found may be mentioned the following:

- (a) Tank cars of solvents set alongside buildings.
- (b) Storage tanks above ground near unprotected buildings.
- (c) Storage tanks discharging by gravity to outlets within buildings.

(d) Discharge systems not equipped with controls allowing the ready regulation or stoppage of the flow from outside the areas where fire may occur.

Lesser quantities of solvents or churned mixtures may present opportunity not only for dangerous room atmospheres but for serious fires, if they are not properly cared for. The not infrequently found practices of carrying solvent in open pails, and having a number of uncovered tubs of churned mixtures standing or in use in work rooms result in fires in such areas being more frequent and more severe than they should be. Flash fires at spreaders are not infrequent, but they seldom result seriously if the supply of solvent or churned material is properly covered. It is very easy to say that solvents and solvent bearing mixtures should always be kept under cover, but it is a much more difficult matter to conduct manufacturing operations and at the same time maintain conditions ideal to safety. Any recommendations made in specific cases must be thoroughly practical or safety will be sacrificed. It is almost always possible, however, by giving a little attention to the matter, to improve on existing conditions and offset the tendency of operatives to become careless in their habits. A system of delivering churned mixtures to spreaders and similar machines by a piping system is ideal, while delivery in wheeled truck tanks, wholly enclosed is nearly as good. Such wheeled tanks as are used in garages might be used to advantage in many factories.

The prevention of needless evaporation of solvent is deserving of effort for the sake of economy as well as of safety from fire. Open churns and open tubs are not now as frequently found as formerly, but in spite of the use of modern equipment, the atmosphere in churn rooms is often sufficiently charged with vapor to be dangerous. It is absolutely essential to the safety of such rooms that the ventilation be such as to dilute the vapor below the danger point, prevent the formation of pockets of vapor, and so stir up the atmosphere that zones of dangerous mixtures will be of small extent. The solvents ordinarily used give vapors heavier than air and adequate floor ventilation is essential to safety. Serious explosions, with loss to both life and property have been due to pockets of gas in churn rooms set below grade. A prime requisite for churn room safety is that the floor be above surrounding grade, and that there be direct openings at floor level to outside.

Natural ventilation, with permanent openings at floor level, open swing sash in numerous windows, and a high roof having louvred monitor, gives good protection for churn and spreader rooms. Artificial ventilation may be satisfactory, but seldom is so. Blower fans are always a hazard, and when running in a duct system where there may be a stream of inflammable vapor, or condensation may occur, there may be very dangerous conditions. There should be no bearings or motors in the path of the air, and fan blades should be of soft metal. The intake or discharge openings for forced ventilation systems should be numerous and well

distributed both vertically and horizontally in order to secure even conditions in the atmosphere. Inlets to fan systems should have screens to exclude dirt.

ENCLOSURES MAY PROVE HAZARDOUS

In many cases efforts to recover solvents from their vapors, or to remove toxic or unpleasant vapors from work room, lead to the enclosing of the devices so as to entrap these vapors. It may readily be seen that such enclosures must necessarily, at one time or another contain dangerous mixtures of vapor and air, unless by careful provisions, they are kept charged with inert gas. Granting that an agency for ignition is introduced to an enclosure filled with an explodable mixture of vapor and air, the explosion that follows is of a force, the magnitude of which depends on the size of the enclosure and on the ratio of the vapor to the oxygen present. The effect of the explosion will depend chiefly on the character of the walls of the enclosure. The force that might be developed by such an explosion is so enormous that no structure could resist it. Enclosures if necessary should be built of the lightest possible material and be constructed to open on the slightest increase of pressure. In the case of enclosures about very large machines it may be desirable to provide rigid side walls, but in such cases free and easy vent over the entire top area directly to the outside should be provided. Such enclosures, arranged to relieve upward within the confines of a building, have given opportunity for very serious explosions occurring secondarily in the space under the roof.

When solvent recovery operations are practiced, it is essential that the apparatus for condensing and distilling be located well away from work rooms and buildings of high value, in order that the pronounced hazard of these operations may not be important in their effect on the whole. Safe and successful recovery of solvents involves intricate problems requiring great care, experience, and intelligence in their handling.

After churn and spreader rooms and their equipment have been arranged with a view to securing effective ventilation and safety from fire involving large quantities of inflammable materials, or areas otherwise occupied, special precautions must be taken with respect to minor equipment and manufacturing practices, to prevent the presence of those agencies which may cause ignition of vapors necessarily present. A very ordinary understanding of the dangers will lead to the elimination of all open flames or lights, and to the prohibition of smoking. Good practice calls for the prohibition of the carrying of matches.

Electrical equipment is at best a constant source of danger, for even minor electric sparks may effect ignition of vapors. All motors should be excluded from churn rooms, and preferably from spreader rooms. Electric lights and wires thereto should be of the vaporproof type as prescribed for hazardous locations by the National Electrical Code. Switches should be excluded from the areas where vapors may be present.

Shaft bearings must receive constant good care in order to avoid overheating. Fast running machinery should be avoided on account of the greater danger of hot bearings and breakdowns, while high speed belts are frequently troublesome sources of static electricity.

STATIC ELECTRICITY

Probably the most baffling cause of fire is static electricity. Charges of "static" are built up under certain conditions upon belts, on moving surfaces of cloth, on the bodies or clothing of workmen, in vapor clouds, and perhaps sometimes in flowing solvents at nozzles or jets. Discharges of "static" electricity occur between bodies having different electric potentials, and if the proper air-vapor mixture is present fire may readily follow. The problems of avoiding fires from this cause resolves itself into the question as to how all the bodies in the danger area may be maintained at the same potential.

Static charges on belts may be avoided by connecting the driving and driven shafts to a common ground, and by picking small charges from the belt to the same ground by means of contracts of fine comb point collectors.

The difference in potential between the cloth being treated and the machine, may be eliminated in part by connecting the knife of the spreader, the steam pipes of the table, and the frame of the machine to a secure and permanent ground. Unless the ground is well done and well maintained the protection afforded will not be satisfactory, and further measures are frequently necessary. Experiments show that static charges exist on the cloth as it is unrolled before the spreader, are largely discharged silently by a properly grounded knife, but build up anew immediately after the cloth passes the knife and rapid evaporation of the solvent occurs. These charges may continue on the cloth and be rolled up with it so that when it is unrolled for a secondary coating they may cause considerable trouble. These charges are very difficult to avoid, and thorough grounding of the steam table does not fully effect their dissipation. Where such charges give recurrent trouble it may be necessary to resort to special humidification to drain them away.

Static charges are frequently developed on the persons of the workmen, some men apparently being more subject to this phenomenon than others. In this connection there is more or less humor in the case of the famous Providence tom-cats. The city fathers, for the dispatch of stray cats, provided a tank filled with illuminating gas for suffocation. In several instances when lively "toms" were cast into the tank, explosions occurred, being caused by discharges of "static." Good practice in spreader rooms provides for the common grounding of men, machines and material tubs, so that all may have the same potential. This is achieved by providing grounded metal floor coverings in front of the machines and under tubs, and requiring workmen to wear brass or copper pegged shoes.

A frequent cause of fire is the discharge due to difference in potential between discharge outlets and containers into which solvents are received. It is important that the discharge device and the container be grounded

together. Failure to properly ground tank trucks has taught the oil companies what is needed in this respect. Serious troubles have occurred in connection with scale tanks where properly interconnected grounds were not provided, while the mere operation of pouring solvent from one pail to another has caused lesser fires.

Grounding is of little value unless it is done with great care, thoroughly and intelligently, and constant attention is given to the maintenance of the grounds.

Analysis of churn and spreader room fires over a period of years shows that such fires are frequent when the relative humidity of the atmosphere is low, and infrequently when it is high. Low relative humidity has been shown to be the most important single factor affecting the safety of churn and spreader rooms, and its frequent occurrence at certain seasons under our American factory and climatic conditions is the explanation of the greater troubles experienced from "static" not only in rubber works, but in cotton mills, in this country than in England. A high relative humidity apparently allows "static" charges to drain off silently through the atmosphere. It has been shown that a relative humidity of 40 to 45 gives a "safe" atmosphere, and it is fortunate that natural humidity falls below this on but few days in the year.

While artificial humidification has been generally adopted in cotton mills to advantage, it is not so commonly found in rubber mills. It can be used to improve conditions where trouble from static is experienced. It has been found oftentimes that the use of constant steam jets at spreaders has prevented the flash fires to which these machines are subject, but general humidification, arranged to operate automatically when required may be the most satisfactory solution in many cases.

Electrical devices, known as "static neutralizers" dissipate static by alternation of light high potential charges on the goods. The experience with these devices in the presence of inflammable vapors has not been entirely satisfactory.

EXTINGUISHERS

Having properly provided for the quantity storage of inflammables, carefully isolated by fire walls the spreader and churn rooms, made adequate provision for ventilation and humidification, thoroughly interconnected by permanent electric "grounds" the various machines and equipment, and having established proper habits of work on the part of operatives, there remains the question of providing proper means for extinguishment of fire.

Automatic sprinklers should of course be provided. Sprinklers will not prevent explosions, and may not be as effective as may be desired in extinguishing fires in open containers of solvents, but they will, if properly supplied with water keep fire out of other materials, and prevent loss to machines and equipment by keeping them cool. The chief danger in connection with the operation of sprinklers in such cases is that open containers of solvents may be overflowed and fire spread. By so curbing

and draining floors that overflowing solvents will be led away to safe points, this danger can be minimized, and sprinklers should never be omitted by reason of it.

Hose streams may by their powerful action spread blazing materials about, and they are much more dangerous in this respect than are sprinklers, the fine spray from which has smothered many fires in containers of solvents.

Steam hose has proved most effective in handling spreader fires without damage to materials, but the use of powerful steam jets has sometimes resulted in the spread of fire from tubs of material. The proper covering of tubs, tanks and pails is as important a factor when fires occur, as it is in affecting the evaporation.

Foam extinguishers of various types have proved to be of great value in extinguishing fires in which inflammable liquids are involved, and their use is to be highly commended.

DISCUSSION

LED BY H. H. GRAEF

There are two kinds of spreaders; one known as the Scotch type of spreader, used to coat fabrics by means of applying a dye to the surface of the cloth; the other, is the dip spreader and the process is entirely different. The cloth is immersed in a solvent which is of a very fluent nature and cannot be used in as small quantities as with the Scotch spreader. It is in a far more inflammable condition due to the fact that the percentage of solvent is higher. There are firms who are willing to take the chance of using Scotch spreaders in a building adjoining or even in a part of the main plant. If they are willing to take that responsibility that is their affair. I think anyone who uses a dip spread process in a building adjoining or connected to or in a part of the main factory building is taking a chance that I wouldn't want to see taken around the factory I am associated with.

In the actual churn and spreader rooms usually, the solvents and cements are in containers of comparatively small capacity. It is one thing to have a container with a cover; it is another thing to keep the cover on. A good many employees are apt to be careless about taking covers off and failing to return them. I think you will find it is a comparatively easy matter to adjust any of these containers so that the cover is a part of the equipment and is normally in a closed position.

Also, in the churns in which cement is manufactured, there are two ways of emptying these churns, one through a large spigot in the bottom; the other, by dumping the churn in order to remove the cement which is thick, in as short a space of time as possible. In the latter case, instances of fire occur while these churns are in process of being dumped. That is a very inopportune time to have a fire because you have a large volume of cement exposed to the air and being emptied from one vessel to another. It is a very easy matter to have it overflow

on the floor or spread about by sprinklers or other equipment. It is possible by a simple mechanical contrivance to regulate them so that they will assume a normal vertical position. In other words, it is necessary to hold them in the dumping position by force. As soon as fire occurs, they erect themselves to vertical position.

In the regulation of humidity, you will find some production men who will tell you this is impractical due to the fact that you will get precipitation of moisture on your product which will destroy the value of the goods you are making.

We have tried for a good many years to regulate the humidity in our cement and spreader rooms. We found the statement that it cannot be done is wrong. By proper regulation of the temperature in conjunction with humidity regulation, it is possible to keep the humidity within a certain range which reduces the possibility of static discharges to a minimum at the same time never reaching the point so you will not have a deposit of moisture either on machinery equipment or goods you are making.

We have found that there is a great deal that can be done in case fires do occur to minimize the extent of the fire. Every man in the department is trained as a volunteer fireman and is a member of an auxiliary volunteer fire force in our plant. Some factories, I suppose, do not have their own fire department and depend for this service upon the city departments.

No matter where that fire department may be that you are depending on, it takes time to turn in an alarm and for the fire department to reach the scene of the fire. In our own factory, it takes a minute and a half from the time the fire alarm in the cement house is sounded for the company fire department to reach the cement house from the central fire station. We have felt that to cut down this minute and a half was extremely important where the risk was so great and where there was so much material that could be damaged. So we have organized this auxiliary volunteer department consisting of the men in our churn and spreader rooms. They are trained to know exactly what they are to do with the fire-fighting equipment available in that department. To show you how satisfactory this arrangement has been, I can tell you in the last three years' time, we have never had a fire in our cement house or spreader room which has not been extinguished before our own company fire department could reach the scene, which means, we have not had a fire which was not out within a minute and a half after it started. We have been successful enough in the extinguishment of the fires that have occurred to confine all our fires to the machine where the fire broke out and to minimize the damage to about 10 or 15 yards of fabric.

INSURANCE REGULATIONS

Mr. Mitchella: One of the most insistent regulations which the fire insurance companies have is the disposal through pour drains, perhaps, of these volatile liquids or whatever liquids may be on the floor at the

time of the fire. They insist these shall be carried away to a cistern of a capacity equal to the total capacity of volatile liquids or cements within the particular room being drained.

At the same time, they insist upon putting sprinklers within that room which will probably discharge many times as much water as the actual contents of the room. This of course carries the volatile liquids down into the cistern through the overflow into perhaps a sewer or river, wherever the main discharge is.

I think that is one of the most vital points of the spread of fire. Sometimes a fire will be carried down through the cistern, and sometimes it is smothered before it gets that far.

I would like to bring out a point also with regard to a sash within such a room. It has been insisted that we install a certain kind of glass so that the explosion will burst out the glass and not damage the walls or throw the glass into the building. I would like to suggest that the insurance companies recommend a type of sash with wire glass, hinged at the top to act as a flap which will immediately close and confine the fire within the room, thereby enabling you to use the steam extinguishment, so that it will be confined in the room.

We have not had occasion to try that out in our own plant, but in another place where we have been bothered some time with explosions and which damage the buildings, we provided such flaps without further damage to the building. We had explosions later where we thought such a system would prevent it altogether and without damage to the building.

I would like to ask the speaker if he knows of any type of recovery system upon which no fire or explosion can occur?

Mr. Milne: I studied quite a number of solvent recovery systems but I don't know of any on which explosions cannot occur. There is a system which is especially designed for safety which, if it is in operation, certainly will prevent an explosion or trouble from occurring, but there have been accidents in plants where that system was installed.

SAFETY CODE COMMITTEE

Chairman Beck: Inasmuch as there is a meeting to take place in a very few minutes, I would like to mention the names of the committee that it was suggested that the chairman appoint to work with the New Jersey Department of Labor on the Safety Code. I will suggest four names and make another suggestion that the four elect their own chairman. The names I suggest are: Mr. Congdon, of U. S. Rubber Co.; Mr. Mitchell, of B. F. Goodrich Co.; Mr. Hoener, of Firestone Rubber & Tire Co., and Mr. Blanchard, of the Hood Rubber Company.

REPORT OF NOMINATING COMMITTEE

Mr. Lawler: The nominating committee wishes to present the following names: Mr. C. F. Horan, for chairman; Mr. E. L. Hewitt, for vice-chairman; Mr. C. T. Wilson, for secretary.

Mr. Mitchella: I move that the secretary cast one ballot for the unanimous election of the nominees.

(Motion seconded and carried and the secretary cast the ballot.)

Chairman Beck: Then it is very becoming for me at this time to present to you our new chairman and I assure you that he has his foot on the gas and will keep things hopping during the next year.

APPOINTMENT OF COMMITTEES

Chairman-Elect Horan: It is the policy of the new chairman to immediately appoint some of the committee members. I am pleased to appoint the following: statistics committee, Mr. Partridge; membership, Mr. Graef; program, Mr. Harvey Wilson; bulletins, Mr. Lyons; safe practice, Mr. Schneider. Chairmanships on the engineering, publicity and health hazards committees have been left open. They will be appointed within the next couple of weeks.

ADJOURNMENT.

Steam Railroad Section

October 2, 3, 4, 1923

L. G. BENTLEY, Chairman

General Safety Agent, Chesapeake and Ohio Railroad, Richmond, Va.

J. G. FITZHUGH, Vice-Chairman

Superintendent of Safety, Colorado and Santa Fe Railroad,
Galveston, Texas

L. P. GREEN, Secretary

Superintendent of Safety, St. Paul and Sault Ste. Marie Railroad,
Minneapolis, Minn.

TUESDAY MORNING SESSION

CHAIRMAN BENTLEY: What a difference there is this morning as compared with last year and the year before when we were beset with curtailment of expenses, and when many of the members of the Steam Railroad Section withdrew their membership because of those conditions which confronted them on their own properties.

The Steam Railroad Section of the National Safety Council has received during the past year the most hearty cooperation of the council. There has been no subject that any member of the Steam Railroad Section has offered to the National Safety Council that they have not given every assistance in their power to carry through.

The Engineering Section of the Council has gotten out some of the most educational pamphlets on industrial hazards, and the cooperation of the bulletin editor with the chairman of our bulletin committee has been 100 per cent. Without the assistance of Mr. Solensten, the bulletin editor, I doubt if even the superior work of Mr. Cott could have produced the high-class bulletins that have been produced during the year.

The National Safety Council has emphasized the trespassing problem in every possible way. Bulletins have been circulated throughout the other sections of the National Safety Council concerning the trespass evil. In our Careful Crossing Campaign, which closed on October 1st, the support of the National Safety Council in distributing our bulletins throughout the sixteen or twenty sections was all that could be desired, all that we could ask. We do know that tremendous impetus was given to the Careful Crossing Campaign through the interest and service of the National Safety Council.

The National Safety News has carried from time to time articles not only on the highway crossing problem but on other problems of value to the railroads for which we cannot afford to show other than appreciation.

In the school work, which is after all the foundation of safety for coming generations, I think it cannot be gainsaid that the National Safety Council is the biggest moving factor in the world to educate our boys and girls so that years hence when they come to us as railroad men to carry on the transportation industry of the country, they will be men already trained in safety and we will not have to re-educate them and correct unsafe habits of long standing.

I want to refer also to the matter of the safety film bureau of the National Safety Council. As all members of the Steam Railroad Section are aware, the council undertook last year to create a film bureau. The membership was circularized; we were urged to subscribe to the film bureau in order that first-class railroad films might be produced. The responses, because of conditions which I have mentioned before, were not all that could be desired. Some few of the railroads, I think about 12 in number, agreed to subscribe to the bureau of film production.

REPORT OF MEMBERSHIP COMMITTEE

ROBERT SCOTT

At the last Congress the Steam Railroad Section had 82 members. During the year, it has secured 13 new members, which are Ann Arbor Railroad, Tennessee Coal, Iron Railroad Company, Dominion Atlantic Railway Company, North East-Oklahoma Railroad, Southern Railway Company, Fort Smith and Western Railway, Georgia and Florida Railway, Sacramento Northern Railway, Oahu Railway and Land Company, Bingham and Garfield Railway Company, Chilean State Railway, Guilford S. Wood Company, and Hayes Track Appliance Company.

Five roads cancelled their memberships, leaving a total membership of 90 with a net gain in membership for the year of 8.

It might be of interest to you to know that the Class 1 railroads not now connected with this section are Boston and Maine; Chicago, Burlington and Quincy; Chicago, St. Paul, Minneapolis and Omaha; Florida East Coast and Rock Island Lines.

REPORT OF COMMITTEE FOR CO-OPERATION WITH OTHER AGENCIES

J. F. GRODZKI

The various agencies which this committee recommends to be solicited are:

Group 1

National, state, county, city, and police officers, as well as the railroad or public service commissions of the various states.

Group 2

Schools, churches, newspapers, and other publications.

Group 3

Rotary; Kiwanis, Lions, Railway, and other clubs, as well as commercial and civic organizations..

Group 4

The National Education Association, the American Association of Engineers, the United States Chamber of Commerce, various motorists' associations, trade and labor organizations, fraternal organizations, the Travelers' Protective Association, insurance companies, particularly those handling accident and automobile insurance, industrial associations, transportation companies other than railroads, radio forwarding stations, and others, which could be added from time to time.

Group 5

Highway and county road map manufacturers and distributors.

REPORT OF BULLETIN COMMITTEE

E. R. CORR

There has been a new idea developed by this committee on making bulletins.

We made a selection of a certain number of hazards which we wished to call employees' attention to in bulletins. This was reduced to writing, scenes were laid, and finally Mr. Solensten, of the National Safety Council, Mr. Mitchell, of the New York, New Haven & Hartford Railroad, and myself went down to Richmond, where there joined by Mr. Bentley, and the Chesapeake & Ohio Railroad was turned over to us; we hired the best photographer we could get in the city of Richmond and worked four days staging those scenes, photographed them, and our year's work was practically done.

I have made four trips to Chicago since the photographs were made. There I met with Mr. Solensten, the bulletin editor. We worked up enough bulletins to keep running for two or three months and I went back home. Mr. Solensten, at press time now reaches in a drawer, takes out three photographs and sends them down to the printer. They are very much pleased with the idea and they are now trying to get the members of the bulletin committees of the other sections to follow that plan.

I want to give you just a few figures. The number of railroads which have ordered bulletins during the period from September 15, 1922, to date is 70. That means that a certain number of our members are not purchasing bulletins from the National Safety Council. I have interviewed a few of them and they state that they don't seem to suit their needs.

The number of bulletins ordered by the railroads during the same period is 197,981. The number of Steam Railroad Section bulletins ordered by members of the council other than railroads is 52,956, which, gentlemen, shows you that about 250,000 safety bulletins, both large and small, have been purchased during the fiscal year of the council and distributed among the membership and among non-members of the Steam Railroad Section. That is one point that we should not overlook in our

bulletin work, the fact that there are a large number of Steam Railroad Section bulletins purchased by industrial members of the council, and the safety work particularly of a public nature covered by bulletins of the National Safety Council is distributed among the industries and schools that we wish to reach.

I wish to acknowledge the assistance of Mr. Mitchell, Mr. Solensten of the council, and the Chesapeake & Ohio Railroad for the kind manner in which they just turned over the railroad to the bulletin committee—freight trains, locals, yards, everything was tied up as might be required for our use. We seemed to have blanket authority to run the whole railroad for the three or four days that we were down there.

(Motion made, seconded and carried to accept the report.)

REPORT OF COMMITTEE ON PREVENTION OF HIGHWAY CROSSING ACCIDENTS

T. P. BRENNAN

In submitting a report on the prevention of highway crossing accidents your committee is not so much concerned about the alarming increase in casualties at crossings as might be supposed from the number of deaths due to carelessness in driving over railroad tracks at grade.

The mystery is why there were not many more, when the great increase in the number of motor vehicles manufactured—approximately 3,000,000 for 1923—is considered.

The joy rider, the illicit, and generally stupifying quality of, liquor imbibed by many persons driving cars have accounted for many of the deaths. Inexperienced drivers and the laxity of the laws governing the issuance of licenses to drivers of motor vehicles, together, contribute stupendously to the mortality lists.

The "business influence," not to make the requirements too difficult, less they retard manufacture and sales, must be borne in mind.

These, and other contributory causes, explain the growing lists of fatal accidents, not only at railroad-highway crossings but on the public highways, remote from railroads, and in the great cities as well.

The consolation is in the fact that the percentage of fatalities has been decreased by just such activities as those of the Steam Railroad Section, cooperating with the American Railway Association Safety Section.

Supplementing the extensive Cross Crossings Cautiously bulletins of the American Railway Association were the excellent bulletins No. 1260 and No. 1275 issued by the National Safety Council, reproducing the poster of the American Railway Association crossing campaign.

Following up the work, the American Railway Association contracted with the Elliott Service of New York and issued a series of photo reproductions of automobile accident results at railroad-highway crossings, featuring the wrecked motor cars, but avoiding the gruesome human wreckage element of the tragic story.

It is shown that coordinating the work of the two committees, so as to bring them into general harmony, has eliminated much of the lost motion and possible contradiction in methods. Such coordination was vital to the success of the crossing campaign by the American Railway Association and by the National Safety Council, Steam Section.

In the problem of grade crossing safety, even more than in any other, it was vital to the success of such movement that we have the cooperation of National Bodies, such as the United States Automobile Chamber of Commerce, National Highway Traffic Association, Automobile Manufacturers Association and similar bodies, as well as the most emphatic endorsement and backing of the movement by the railroads themselves. In addition to such approval and cooperation, the railroads asked the cooperation of city, town, county and state authorities on the question of improving the view on approaches to grade crossings. Coincident with such cooperation the work of track supervisors and section foremen, to keep shrubbery and sand embankments cut as low as possible, where they obstruct the vision of enginemen or that of persons driving vehicles near the approaches to grade crossings, was very generally observed.

Periodical talks by safety men to groups of crossing watchmen, with a view to the discouragement of unsafe practices by the crossing men, particularly the tendency to be "too accommodating" and thereby taking chances in allowing vehicles and pedestrians to cross the tracks when approaching trains are in sight, were given by safety men on most of the railroads, with gratifying results.

Road foremen of engines talked to the enginemen and firemen on the rigid observance of the rules governing the use of the whistle on approaching crossings and to repeat the crossing signal when this was necessary.

EXTENSION OF WHISTLE CORD

A recommendation that the whistle cord be extended to the fireman's side of the cab, as has been done by some of the lines, did not meet with general acceptance. In fact the exception is the rule.

The question of part time protection of grade crossings by gates has been forced to keener attention by the increase in the vehicular and train movements over crossings so protected. It has been strongly urged that 24-hour protection be made standard practice. It has been recommended that where such full time protection is not advisable the gates be removed, for the reason that the traveler on a public highway usually assumes a raised gate means it is safe to cross.

Long handle disc signs—Not to be less than six feet in length, are used instead of the short handle disc sign by some of the roads, for the reason that there is a tendency on the part of crossing watchmen to allow the short handle disc to rest on the ground or carry it under the arm in such a way that it is not visible. This cannot be done with a disc having the long handle, as recommended. There are many other reasons for substituting the long handle disc sign for the short one. One of my colleagues does not agree with me and feels the short handle disc sign is sufficient.

Action looking to the discouragement of the erection of large billboards near grade crossings has been considered. The advisability of seeking the cooperation of abutting property owners in the discouragement of leases of land for this purpose, where it endangers the view to approaching trains or the view of approaching trains to approaching vehicles on the highways, has been taken up by individual roads, as the question is local.

The rapidly increasing number of persons driving cars on the highways and who are unfamiliar with railroad operation, especially with the hazard of double track operation may eventually demand the consideration of a departure from the varied types of grade crossing signs. This may even imply abandonment of the present type of sign. On some lines the multiple track is indicated by a board nailed over the present sign with the word "Two," "Three" or "Four" indicating multiple track. This, if adopted as standard would lead to the eventual education of travelers who would use more caution at such crossings.

The question of extending the time period in which the crossing whistle shall be blown, has been given considerable discussion and investigation by some of the lines and there is much merit in the thought that the fourteen seconds whistle as used on the Chicago & Northwestern might be used on many of the other lines. Some of the larger systems, after an extensive investigation of the merits of this, however, found by consensus of opinion expressed by enginemen, superintendents and others that the present signal, approximately six seconds, served the purpose and where necessary a repetition of the standard whistle signal might be given. An objection to the longer whistle, in cities and other congested territory is, that the noise would probably bring the railroads under the inhibition laid down by the Department of Health in the territory directly affected, where unusual noises are regarded as a nuisance and a violation of the health law. However, some of the roads have adopted the Northwestern method, with gratifying results.

One of the big problems confronting the steam railroads is some way to raise funds to pay for the elimination of grade crossings.

What has made this question of elimination so dominant? We must all answer that question alike: The automobile.

The financial burden on the state, the municipality and the railroad for a speedy elimination is so large as to be prohibitive under the present method.

It is a fair conclusion that the persons directly to be served should pay the greater part of the cost of elimination. To this end it has been suggested that an additional fee of \$5.00 per year be made for every automobile, the sums thus raised in each state to become a "Special Grade Crossing Elimination Fund." With approximately fifteen million automobiles in 1924, a fund of \$75,000,000 could be raised the first year after legislation to make such fee and fund effective. This would lessen the burden on the general taxpayer, create a large fund, increasing yearly, and reduce the cost to the railroad, the state and the local municipality.

The highway commissioners of ten states have favored a trial installation of the ordinary cross buck grade crossing warning sign in the middle of the highway, similar to the one at Meadow Grove, Neb., on the C. & N. W. R. R. Seventeen other states were opposed to the plan, the remaining states not committing themselves.

THE RAILROADMAN'S APPROACH TO SAFETY THROUGH THE SCHOOLS

**DR. E. GEORGE PAYNE, PROFESSOR OF EDUCATIONAL SOCIOLOGY, NEW YORK
UNIVERSITY, NEW YORK CITY**

The very rapid development of the railroads during the Twentieth Century is remarkable to me, and equally remarkable is how the railroad men met those conditions that were arising at that time with reference to safety of the employees and safety of the traveling public.

Beginning with the period from the 60's to the 70's, railroad building proceeded with unimagined rapidity and the problem of the railroad men was the training of a constantly increasing new group of employees who had not been trained and equipped to handle the problem of the railroads, and the traveling public likewise was not trained in traveling on the railroads, and as a result it was during this period that the peak of accidents occurred, but they were largely, as I say, to employees and to the traveling public.

It is, then, in the Twentieth Century, that we come to a period where the problem is entirely different, where the problem is one not of dealing with the employees mainly and the traveling public, but with those who are crossing the railroads and crossing them with that new instrument of Twentieth Century development, the automobile.

The problem of accident prevention in the Twentieth Century so far as the railroad is concerned is a problem of reaching the public with definite information and definite notions of observing safe practices. I am over and over met with the feeling that it is dare-deviltry and taking chances on the part of the driving public that causes accidents, which I do not believe is at all true.

I think in studying the statistics of accidents after devoting a number of years to a study of this problem from a point of view of causes, it becomes very clear to me that there are two causes. One is the habit of crossing railroads that has been developed in most of us does not meet the situation of crossing railroads today. We have been used to crossing railroads either on foot or in slow-moving conveniences, because the automobile is a very recent development. It was 1910 or '12 before many of us rode a great deal in automobiles, and the great mass of the driving public have become owners of automobiles, as you know, within the last three or four years. They are new at the business.

Another thing is the ignorance of the public with reference to the time that should be allowed before attempting to cross a railroad track if a railroad train is approaching.

SPEAKER SUGGESTS SOLUTION

What is the solution? The solution involves, it seems to me, three elements. One is a new visualization of the dangers of railroads to the automobilist. The old "Stop, Look and Listen" sign will not do the trick because the sign is a thing that was developed when we had pedestrians and slow-moving vehicles. It does not suggest to the driver these days the danger that he is meeting. In the first place he doesn't have any time to stop if he is driving an automobile, and I never have seen an automobilist yet who liked to stop when he was driving, and I have driven 100,000 miles. He can't listen because the whirr of his motor is making too much noise for him to hear very much else, and he can't look very well because he is observing the road and his driving. The "Stop, Look and Listen" and numerous other signs are inadequate to meet the situation at the present time. There must be visualization by new methods that are far enough back from the railroad itself that they will call the attention of the driver unmistakably to the situation that is ahead, because you have to establish new habit with reference to this particular situation.

The second is with reference to a consistent newspaper publicity that will put this whole problem before the American people as it is. Ninety-nine of the people with whom I have talked blame the railroad for accidents, I care not what they are. The very fact that in most of the states, in all of the states as far as I know, every accident to an automobile credited to a railroad accident is an indication of the attitude and point of view with reference to the public, and they are not responsible for it. Therefore, there must be newspaper publicity that is turned upon the realization, that calls to the attention of the public that the railroads are public servants that have their tracks and have the right of way, and it is the problem of the public, if we are to have railroad service, that they do have the right of way and the pedestrians and motorists keep off the railroads when the train is there.

The problem with which I am concerned is that of school safety as a means of reaching the public. Are you aware, ladies and gentlemen, that there are in the United States today 800,000 public school teachers and 20,000,000 pupils in the public schools? Are you aware that there are 1,000,000 teachers in public, private and parochial schools, and 25,000,000 children in public, private and parochial schools in the United States? Are you aware that every family, virtually, in the United States is represented either directly or indirectly in the schools in the United States today?

I have a friend who is one of the Vice Presidents of the National Biscuit Company, and he said to me a few years ago that if he could put into the hands of every child an announcement of "Uneda Biscuit" to take home to the parents, he would not ask what it would cost to get that privilege, he would not only provide the material, but he would not ask the cost of that privilege. That is a privilege that you have of putting into the hands of every father and mother and every child in America the situation with reference to accidents to the public.

I say this because I know the situation now. I know the interest from the teacher point of view and the public point of view, because I have been dealing with that for five years. This is the Sixth National Safety Congress in which I have taken a very active part.

When I began five years ago to make speeches on safety education, the average educator merely smiled. He said, "What does the school have to do with accident prevention?" He said, "Payne, you are crazy to talk about the schools having anything to do with accident prevention. It is not their problem; it is the problem of the police, it is the problem of the railroads, it is the problem of the automobilist, it is the problem of everybody else under the sun but the schools." It was with difficulty that I could be heard upon the problem of accident prevention before a body of education. I should have to slip in under such disguised names as the conservation of human welfare, which might mean anything. I disguised my speeches under all sorts of names before bodies, when I was called upon to speak, in order to be heard. If I had said in any one of these places that I would like to speak upon the subject of accident prevention with respect to school education, I don't believe I could have been heard.

THE CHANGE IN THE ATTITUDE OF EDUCATORS

What has happened since that time? Superintendent Cody of Detroit was one of the first who became committed after the plan was worked out. Mr. Reszke, under Superintendent Condon of Cincinnati, undertook the work in Cincinnati. Little by little the propaganda of the school program has gone on until it is one of the most popular subjects among teachers of the United States at the present time. That has been one of the things that I have seen grow during those five years.

A year ago one of our leading universities, the New York University, with 20,000 students and perhaps 25,000 students this year, established a course for teachers in education in accident prevention, and I have in my classes now after the first week of school, some 500 teachers who are taking courses devoting a whole half year to a study of the accident prevention problem from every point of view. That is the only university so far that has done this, but during the past year in Columbia University I was asked to address the students. I was asked to address a group of the faculty, and one member of the faculty not only said, at that time, but said afterwards to his classes that he regarded the contribution to education in accident prevention as a phase of the reconstruction of the curriculum as an integral part of the curriculum and one of the greatest contributions made to education in the Twentieth Century. That was Professor Kilpatrick of Columbia University, who is one of the leading educators at the present time.

The five years seem to me to have been a period of propaganda. It is a period in which we have sought to bring to the American educator and to the American public the necessity of accident prevention as a part of school routine and as a part of school instruction. I do not need to point out to you here some of the results that have been accomplished

in the reduction of accidents. In every city there is a reduction. Kansas City is the most recent one that has come to my notice in which they cut their accidents to children in two after beginning the work at the beginning of this year, and not only that, but it has had a reactive effect upon the people in the community. The fact is that the American School teacher for the most part is now ready to undertake this job. Our great problem from now on is that of providing adequate material and putting adequate material in her hands that will help her to solve the problem. There is adequate material that can be had at the present time because that has been going on with the idea of developing material to supply the needs of teachers, and I think the railroad men of the country can accomplish an enormous amount of good and can have 25,000,000 school children in the United States getting the right attitude toward the railroads by participating in the movement of providing adequate material to the teachers who are demanding it all over the country in getting the safety message home.

ADDRESS OF PRESIDENT DOW

There is one suggestion I want to make in connection with the Careful Crossing Campaign, a suggestion that I am making because of the fact that during the past year in my connection with safety work in the greatest city in the world where we have applied advertising principles to safety, there would be a certain psychological effect upon changing the type and style of your posters. Don't think for a minute that I am criticizing the poster that you got out this year; I am merely offering this to you as a suggestion from my observation of advertising principles applied to safety. When you first see this splendid poster that you have put out on the railroad crossings, you are curious, your curiosity is aroused. The average driver will stop and look at that poster the first time he sees it to find out what it is all about. It makes an impression on his mind. Now it is a question, of course, as to how long that impression will remain on that person's mind. On some person's minds it will remain a great deal longer than on others.

If it were practical and if it could be so arranged that you could get out a series of four posters, each and every one of them a different type, a different style, appearance, and send out your first issue during the month of June, your second in July, your third in August and the fourth in September, you would simply multiply the effect of your message four different times. It would be very much like trying to drive a nail into a plank. You give that nail one blow with the hammer and you drive it in a little way, but you could take hold of it with your hand and work it around and pull it out. You give it a second blow and it goes a little further and it would be a little more difficult to take it out. But by the time you have given it four distinct, hard raps you have driven that nail in so far it will stick. It is the same proposition in getting out safety advertising of any character.

Let me close my few remarks by saying that the railroad men from my past experience are the liveliest wires we have in the Public Safety

Movement. They are a credit to the National Safety Council and to the American Railway Association because of the worthy safety service they are rendering in those sections. It is a great and noble work that you are doing.

"What is noble gives a finer
Portion of the mind and heart
Linked to something still diviner
Than mere language can impart.
Ever seeking, ever finding,
Some improvement yet to plan
To uplift our fellow-being
And like man to feel for man."

PUBLIC ASPECT OF THE WORK OF THE BUREAU OF EXPLOSIVES

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To appreciate the public aspect of the work of the Bureau of Explosives we must know the nature of it and why it was undertaken.

The object of the work is to promote safety in the transportation of explosives and other dangerous articles. Interest of the public in this work is measured by the volume of the traffic, its actual and potential hazards, and the number of people directly affected by the safety rules whose development has been one of the principal features of the work.

About 400 million pounds of explosives are produced annually in the United States and Canada, and much of this total is shipped more than once. During the year 1918 when the production of explosives and ammunition was at its peak, over 50,000 cars bearing the explosive placard were constantly in transit. A list of the principal dangerous articles other than explosives shows 182 commodities. The following compilation from our records of transportation property losses for the past 12 years show that 13 of these commodities have caused total losses exceeding \$100,000:

Total Amounts of Losses Reported 1910 to 1922, inclusive.

Name of Article	Amount of Loss
Gasoline	\$4,863,096
Nitric Acid	691,064
Petroleum, Crude	661,852
Alcohol	623,852
Matches	488,420
Charcoal	259,967
High Explosives	*210,531
Sulphuric Acid	208,845
Naphtha	207,698
Motion Picture Films	138,803
Black Powder	122,417
Carbon Bisulphide	110,978
Benzol	104,645
*Does not include Black Tom disaster.....	\$20,000,000

The average annual production of gasoline is increasing rapidly and exceeded 40 Million pounds in 1922. To load this amount of gasoline in tank cars each 40 feet long and holding 8,000 gallons, would require 5 million cars which, united, would form a train reaching once and a half times around the earth at the equator.

To estimate the number of people directly affected by the transportation safety rules, we start with more than two million employees of the carriers, add unknown thousands of manufacturers and shippers for each of the principal dangerous articles, other thousands of shippers of unlisted dangerous articles and other thousands of manufacturers of shipping containers for these articles. To the grand total thus obtained we must add the balance of the people living in the United States and Canada. They are interested since the public furnishes the majority of the victims when serious explosions and fires occur in transit.

ORIGIN OF BUREAU

The American Railway Association is an organization of the railroads of the United States and Canada formed to promote efficiency in operation. In many respects, it functions for the railroads as a general staff functions for an army. Its work is done by committees composed of railroad officials, geographically distributed, and serving without compensation. These committees investigate and recommend. When their recommendations receive the approval of the association they become a recommended standard for the guidance of all members. The final step making them effective is the order issued by the individual road.

In 1905 the attention of this association was drawn to the fact that explosives were being transported in rapidly increasing quantities without the protection of a uniform set of rules to govern the preparation, acceptance and handling of this dangerous freight. The danger was emphasized by reference to several disastrous explosions of material in transit.

To prepare a satisfactory set of rules required technical knowledge and experience not possessed by the average railroad official. This was a typical problem illustrating the necessity for the American Railway Association. It appointed a new committee whose membership included the most experienced chemist in this line in the railway service. This Committee on Transportation of Explosives conferred with experts representing the explosive industry, the Army and the Navy. It prepared a set of rules that was approved by the association in November, 1905, and prescribed thereafter by many individual roads. Theoretically, the problem was solved and this dangerous traffic was safeguarded.

A year later this committee reported to the association that, practically, the problem was not solved. The rules were not effective. Many shippers and railway employees were not familiar with the requirements. A few of the roads had employed special inspectors in an effort to make the rules effective on their lines and these inspectors reported many violations and many difficulties in securing compliance. It was evident also that one road could not protect itself against danger due to violations of the rules

originating on one of its connections. A car transferred to its line at a junction point might contain dynamite improperly manufactured, packed or loaded in the car, and an explosion might occur while the car was being properly handled by entirely innocent parties. Inspection work on all lines, under a central control, was recommended to the association as the next necessary step. Students of the evolution of a centralized authority under the spur of necessity will find this incident interesting as well as the subsequent steps in the development of the work of the Bureau of Explosives. Previously, the American Railway Association had assumed no responsibility for the enforcement of its recommended standards. This was accomplished by individual action of its members. If an operating rule was disregarded on one line and a collision resulted, other members of the association were not affected primarily. The explosive problem was different. There was a lag between cause and effect. As a rule the man at fault was not the one to suffer for his error.

To obtain this centralized inspection, the committee recommended the organization of a Bureau for the Safe Transportation of Explosives and Other Dangerous Articles, for which it had prepared a constitution and by-laws. This recommendation was approved by the association in November, 1906. During the Spring of 1907, President Roosevelt was approached and he consented to the loan of an officer from the Ordnance Department of the Army to assemble and train the personnel of the proposed inspection force.

INITIAL POLICY SUCCESSFUL

A survey of the situation showed that the manufacturers of explosives were antagonistic to the plans of the railroads. They claimed that explosions had been due to carelessness of railroad employees, rather than to defects in manufacture or packing of explosives. They resented also an attempt that had been made by a railroad official to secure federal legislation placing federal inspectors in all powder plants at the expense of the manufacturers. At that time these manufacturers were divided into two groups, the Dupont Company and the independents. The commercial rivalry between the groups was acute but they were in agreement in their opposition to the railroads.

The Chief Inspector had been in many of the plants of both groups in connection with work for the War Department, and had many personal friends and acquaintances in both groups. At his invitation a well attended and extended conference took place at which prominent men sat at the same table with their commercial rivals for the first time. They were invited to become partners of the Bureau of Explosives and to help make the rules what they should be to promote safe transportation of their products. This safety was even more essential to them than to the railroads. This new policy removed their opposition. A committee representing both groups was formed to work with the Chief Inspector and from that date a most gratifying harmony has existed between these manufacturers and the Bureau. They helped to revise the rules and agreed to make them more stringent. They consented to strengthening their

packages that cost them many thousands of dollars annually. They gave our inspectors free access to their plants and storage magazines. They made changes in their methods of manufacture whenever recommended by our chemists. When our experience showed later that we needed more authority back of the rules, they helped us to draft and get through congress a law that invested the Interstate Commerce Commission with power to prescribe rules. They applied for membership in the Bureau of Explosives and for years have contributed from \$8,000 to \$10,000 annually to its support. Can anyone cite an instance where a plea for the cooperation of an avowed antagonist has met with a more generous response?

The same policy has brought to the Bureau the friendly support of many other organizations of manufacturers and shippers of dangerous articles other than explosives, including acids, drugs, matches, charcoal, compressed gases, fireworks, etc. As the rules developed, specifications for shipping containers of dangerous articles became an important part of them, and the same policy brought us the cooperation of the manufacturers of these containers.

LEGISLATION

Many changes have been made in the rules since the American Railway Association prepared its small pamphlet in 1905. The pamphlet has grown into a book, and for recommendations of railroad officials we now have the requirements of a federal law with penalties for violations. This growth is pregnant with suggestions and lessons of general interest.

As citizens we complain frequently of our legislative machinery. A statistical report of the number of laws passed annually by the legislative bodies of the United States, federal, state and municipal, is impressive. Many of these laws are "filed for reference only." The average citizen remains ignorant of their provisions.

For more than 16 years the Bureau of Explosives, with the cooperation described above, has been engaged in developing a law that is of vital interest to millions of our citizens because it affects their daily activities. This development has been based on experience and reason. It furnishes an example of legislation by true democratic methods that should find other applications in the future.

When a new rule, or modification of an old one, is suggested, the first step is a thorough joint investigation by the Bureau of Explosives, representing the carriers, and a committee representing the industry affected. The probable effect of the proposed rule on manufacturing and transportation practices is gauged from all angles. The practicability of the rule is a prime consideration. Long since, we learned that unless reasonable enforcement is secured a rule is of no value. The cost of enforcement is also of prime importance. A rule that curtails waste by \$5,000 is of no value if it costs \$10,000 to enforce it. A rule that increases safety generally means additional cost to some one.

Frequently, as in rules for better packages, the cost is paid by the shipper, while the immediate benefit in reducing losses is reaped by the carrier. When these naturally antagonistic agencies agree, the Inter-

state Commerce Commission has *prima facie* evidence of the reasonableness of the proposed rule. Congress has authorized the commission to legislate for it in this limited field. By its approval the commission can transform this agreement reached by the Bureau and the industry into a law. It is a federal law amply supplied with teeth, and yet the federal legislature has taken no direct part in framing it. No direct part in settling the details has been taken even by the representative of the federal legislature, the Interstate Commerce Commission. In every sense of the word it is a law "for the people and by the people." It is worded by the best informed of the men who will be affected by it. In the process their object is worthy, the promotion of safety, and their reasons are well on the table. The men who suggested the law assume also much of the responsibility for enforcing it. For such a law enforcement is relatively easy, since the parties affected want to comply with it. The teeth in the law are used rarely, but they are necessary to control the occasional rebel.

Occasionally the Bureau of Explosives and the shippers cannot agree on a proposed rule. The Interstate Commerce Commission then calls for evidence and arguments, and after a hearing decides the issue.

About once every three years a general revision of the rules becomes necessary to incorporate in them the lessons of experience and to provide for new conditions. Suggestions for this revision from all sources—shippers, manufacturers, railroad officials, and our inspectors and staff, are compiled by the Bureau and proofs of the proposed revision distributed to railroad officials and to representative committees of interested shippers.

From constructive criticism secured in this way successive proofs are prepared and distributed, after which a final proof is submitted to the Interstate Commerce Commission. The practice of the commission has been to then appoint a date for a public hearing on the adoption of the proposed revision. At this hearing all interested parties are invited to record their objections.

This unique method of framing and checking a proposed law before adoption and promulgation seems to offer a maximum of insurance against mistakes. The Chief Inspector of the Bureau of Explosives, after conferring with his inspectors, who are practical railroad men of long experience and geographically distributed throughout the United States and Canada, and after receiving the constructive criticism of railroad officials, is able to gauge quite accurately from the railroad standpoint, the advantages, disadvantages and the practicability of a proposed rule. In a similar way these qualities are gauged from the shipper's standpoint.

Another great advantage comes from our ability to change a rule, to correct a mistake or to meet a new condition. It is unnecessary to call a special session of a legislature. The Interstate Commerce Commission can make a change effective on one day's notice.

ENFORCEMENT

The second important feature of the work of the Bureau relates to the enforcement of the rules whose origin we have described. We know too

well the defects of the normal method of enforcing a law. The citizen is assumed to know the law and it is immaterial whether he approves it or not. Use of the teeth of the law for punishment is the normal way to force a compliance.

Our policy has been to invoke the teeth as the last resort. Our experience indicates that no law affecting a large number of widely separated people can be enforced unless the great majority of these people are familiar with the law and approve it. To enforce the required packing of dynamite for shipment by a given company, the officers of that company who approve the rule are more useful to us than would be a score of policemen. The shipper of a dangerous article is required to certify on his written request to the carrier for transportation, that he has complied with the regulations of the Interstate Commerce Commission. Under normal conditions this certificate is a passport to acceptance by the carrier, so that the shipper is practically placed on his honor to know and obey the law to which he certifies compliance. The honor system works with honest people and only the exceptional are dishonest.

EDUCATION

It is difficult for the average man already fully occupied with his regular duties to become familiar with all the details in the book of rules that affect his work. The principal part of our work for enforcement is educational. Our inspectors are frequent visitors in shipping departments where errors originate and they deliver illustrated lectures to audiences of railroad employees and shippers. They visit, for careful inspection, the many railroad stations in their districts. They inspect, periodically, all explosive factories and storage magazines in their territory to detect and condemn before it gets into the stream of traffic, material that is not in a proper condition for safe transportation.

The mental attitude of the average shipper toward our work is indicated by the fact that he welcomes these inspections and tries to profit by them.

RESULTS TO DATE

We can never hope to eliminate expensive accidents in any department of railroad operation. The best we can do is to establish and hold an equilibrium between our maximum effort for safety and the average of forces that work for destruction. We have reduced our transportation losses for explosives to about \$33,000 per year. For all other dangerous articles the total is about 1¼ million dollars per year. The possible losses that constantly confront us, however, are very disturbing. At Black Tom Island, New York Harbor, in July, 1916, a fire started in a railroad yard by a German agent or sympathizer, produced an explosion that cost over 20 millions of dollars. At Ardmore, Oklahoma, in 1915, an accident caused by a tank car of casing head gasoline cost over one million dollars. In spite of our best efforts, the destructive forces that menace us may duplicate or approximate these disasters at any time. In the meantime, let us take comfort and encouragement from the fact

that in the year 1922 the total losses incident to the transportation of explosives, ammunition, and fireworks of all kinds in the United States and Canada, amounted to the magnificently small sum of \$75, and not one life was lost.

RAILROADS AND THE PUBLIC

Fortunately for us nature tends to make us satisfied with our lot in life. A coal miner is sorry for his unfortunate brother who has to labor in the hot sun. The man working in a dynamite factory is sorry for the man who works in a black powder factory. Familiarity with danger breeds contempt for it and handicaps the acceptance of safety recommendations. An advocate of safety methods could accomplish little on a battlefield. He might command some attention in the rear lines. A railroad operating man is always in the front line and is always confronted by forces inimical to safety. More than average credit is due, therefore, to the railroad man who overcomes this handicap and works with us for safety.

The writer came from the public to this railroad work of the Bureau of Explosives and for over 16 years he has had every opportunity that intimate personal association offers to become familiar with the railroad man, official and employee. Efficient operation of a large railroad is a stupendous task. Above all it requires energy that is well symbolized by its ever revolving wheels. It demands red blooded men with endurance, courage, balanced judgment and a realization of the responsibility that rests on them as guardians of the life and property of the public. Without stopping to make further inquiry the public should gratefully salute the personnel of a well run railroad, and in the United States and Canada we have the best railroads in the world.

WEDNESDAY MORNING SESSION

Chairman Bentley: We will proceed with the program at the point where we left off yesterday morning.

(Resolutions expressing best wishes to John T. Broderick and Ralph C. Richards, both absent on account of sickness and congratulation to Arthur Ridgeway on his promotion were adopted.)

(A report of the Publicity Committee made by Mr. Adams, chairman, was adopted.)

THE MENTAL CAUSES OF PERSONAL INJURIES

ISAIAH HALE, SAFETY SUPERINTENDENT, ATCHISON, TOPEKA & SANTA FE RAILROAD, TOPEKA, KANSAS; CHAIRMAN, SAFETY SECTION, AMERICAN RAILWAY ASSOCIATION

At the annual meeting of Safety Section, American Railway Association in St. Louis last spring, I recall that with that modesty which is so characteristic of me, I offered to tell you of some mental cruising—I have been doing in a sea which had, up to that time, been an uncharted one, but inasmuch as my offer to spread this aggregation of ideas before you

produced no wild public clamor that I was unable to control, I tied a bit of mourning on my ambitions, took them back home with me, and refused to be comforted until some one told me if I came down to this convention, and if some other person on the program fell and broke a leg and couldn't get here, my chance would come automatically. That should prove a rather pleasing circumstance to you all, because it proves that ones' chances are never irretrievably gone—if you don't get in at St. Louis, you may get in at Buffalo.

Seriously, however, my thoughts slowly arrived at, but honestly believed, may not be new to you at all. I only know that I have never heard the subject of safety talked along the devious lines which I shall follow. This isn't an offering which I have prepared for this occasion, because I have talked it on our line for the last year to audiences made up, so far as I could control, of our supervisors, our foremen, and the new men in the service, but with special attention to getting our apprentice boys in, and being somewhat more acrobatic than learned, will stand me in good stead, because I am going to jump around from one high spot to another, and if my talk seems to lack sequence or continuity, it is due entirely to the fact that I feel a certain time limit is put on me, and that my subject is so much larger than my mental horizon.

I long ago made up my mind that the real reason why a Safety Movement years ago was because, as some one aptly put it, it was realized finally that a physical disability is a great moral injustice to the man injured. With our men, I argue every railroad man should be a safety booster for the reason that the safer we can make our line, the better railroad it is bound to become. The better it becomes, the bigger it will grow, and the safer and better it becomes, the safer and better and bigger their job and mine is going to be.

The fact that in 1921 there were 932 fewer railroad employees killed on American railroads than the year before, the lowest number killed in any one year since 1889, 32 years before, was a mighty pleasing circumstance. Frankly, I know of no large railroad that today does not show quite an alarming increase in the number of injuries to employees, especially over last year. But even at that, I am not discouraged, because I know that the Safety Movement has done more to harmonize the relations between employer and employee than any other one influence that has ever been felt in American industry.

I am going to try to talk common sense to you people this morning, and that, in spite of the fact that one of the most uncommon things in the world is common sense. I read a book a few months ago on the Mental Causes of Accidents, by Boyd Fisher. If you haven't read it, I hope you will. A great many of my ideas are culled from Mr. Fisher, and in two or three instances I quote him outright.

SMALL GROUPS ARE CAUSE OF RAILROAD SHOWING

As a base for starting, I am told that industries have made a better showing along safety lines than have the railroads. The reason advanced by some is because men in industries work in larger units than is the case on railroads and therefore are given closer supervision, but if that

were true it should be equally true in our shops—and it is not. Not only within the last year, but within other years, the larger number of our injuries have been in our shops. I am rather inclined to believe the real reason for it lies in the fact that the industries have taught safety to their men, while the railroads have only preached it to theirs, a distinction, and a difference, if you please.

It is claimed a man is six times as liable to injury in the first month of his service as in any other 30 day period following his first year. If that is true, economy of effort should suggest more painstaking care with the new man who comes into the service. A good part of the accident hazard with beginners is because of nervousness due to strange environment, to distractions due to unfamiliar noises and confusion. This confusion can be reduced by a more friendly and considerate introduction of the new man to his job than he usually gets, by painstaking effort on the part of the foreman to coach and instruct and train him how to do his work safely, and by reassurances from time to time to give the new man confidence in himself. I might add that a word of praise now and then would help a lot.

I tell our foremen that times are changing. The successful foreman of the future is not going to be a driver of men; he must be more than a mere leader of men, he must be a teacher, an educator of men, and I tell them that the foreman who believes he is going to "get by" during the next five or ten years with the same degree of efficiency he has shown in the last five or ten, is headed towards the discard, just as sure as I am standing here.

I hold that safety is a by-product of interest in the job. We say a man was to blame for an injury because he allowed his mind to wander. I take the position that the foreman has it in his power to so interest the man in his work as to preserve his equanimity so his mind will not wander. We, or you, get a report that a man stumbled and fell; if the foreman who made the initial report gave it any thought at all, it was to make only the most casual inspection of the location to see if there was anything there that might have caused the man to fall. We give no consideration to the mental condition of that man's mind which made it possible for him to fall or, at least, that made it impossible for him to keep from falling. We take no cognizance of the fact that in nine out of ten cases of personal injuries there was some defect in the mental process of the man who was hurt. We look in our machines, we look in the air, we look on the floor, we look everywhere for the cause of personal injuries, except where the cause actually lies, in the mind of the man.

Of any number of people exposed to a contagious disease, comparatively few succumb and a much larger number remain immune to it. It is just so with mental influences.

SAFETY INSTRUCTIONS MUST BE REPEATED AGAIN AND AGAIN

All men cannot be reached by the same cause. Mr. Boyd Fisher in his excellent book "The Mental Causes of Accidents" says that no analysis

of the causes of personal injuries should be attempted without keeping forever in mind the fact that there are certain types of men who are especially prone to mental failure. Once in a while we find a foreman who speaks a word of safety to the new man, but too often it is never mentioned to him. Safety instructions given the first day of a man's employment, as valuable as they can be, are absolutely wasted unless they are repeated often enough for him to know. Telling a man a thing once does not make him know it; knowing is a condition of his mind, and not of the mind of the man who is telling it to him.

I think you will admit that the average workman has no better or more active brain than the average college student, and yet I have heard it said that the average student has a brain that is curiously constructed so as to resist the intrusion of knowledge. If that is true, and it is found necessary to pound things into the head of the college man, I ask you why in God's name should we expect any lighter task in connection with our men?

Mr. Fisher says, until you have broken down a new man's resistance to helpful information, on the score of inexperience or ignorance you must consider that man an accident risk. If a new workman gets off to a bad start and forms bad working habits, he must unlearn all that he has learned wrong. You will agree that good working habits can be made just as big a factor in efficiency as bad habits can be made a factor in inefficiency and, with proper training, good working habits are just as easily formed as bad ones.

At no other time of a man's service does a workman so consciously and so willingly place himself under the helpful influence and the guidance of his foreman as he does on the day he comes to work for him. I tell our foreman that if they do not, in the early days of a man's service, get his sympathy, his interest, his friendship, and his respect, they will never get it as long as they live. The need of this is emphasized by the old truth that first impressions are more lasting.

THE PERSONAL RELATIONSHIP

How often does a department head on an American railroad give instructions that he wants to see every man who is hired to work under his jurisdiction, who brings that new man into his office, sits him down across his table, leans over on his elbows and looking that new man square in the eye, gives him a kindly heart-to-heart talk for five or ten minutes—who tells him of the privileges and possibilities of the service which he is just about to enter; who tells him of the responsibilities of citizenship in the little town where he may have just come to live; who tells him what is expected of him and what in fairness he ought to be willing to give; who tells him of his obligations to every man with whom he works, of his obligations to give an honest day's work for an honest day's pay; of what his company has done to provide him a safe and a pleasant place in which to work and which will all go for naught unless the man will use those facilities, and use them intelligently? It isn't done at all, or if it is, it is done so rarely as to be

almost negligible, but yet, in the same breath I want to tell you that just as we so often fail to start our new men right, the Communist, the Socialist, the Bolshevik or I. W. W., who are with us to an extent that some of us little know or dream, never lose a chance to start that new man wrong, and they do it by pouring into his unsuspecting ear the vitriol of hatred against society as a whole, against you and me, against our government, and even against the company whose benefaction he then enjoys.

It is because of this that an undesirable not infrequently gets into your service, an undesirable who has the same effect on the balance of the organization as has a bad apple or a bad potato in a bin or barrel of the same. He taints every man with whom he comes in contact.

The managers of industry are just beginning to appreciate the different levels of intelligence in men. How many of you know that out of the 1,700,000 men who were given a psychological test in the war draft, 70 per cent were given a mental rating of a child 14 years of age or less, and how many of you know that 45 per cent of that number or 31½ per cent of the entire total, were rated as morons by our government experts—a moron being defined as one who is "non-capable of complete self-guidance."

With that before us, I hold it is nothing short of absurd to hire any number of men, give them all the same handling, treat them all alike, and then expect the uniform results which we do expect. I contend that if you hire 100 men, you have 100 different temperaments and 100 different dispositions, and to handle them intelligently and successfully, you must handle them in 100 different ways.

THE VALUE OF TRAINING

Safety is a state of mind, a state that can be brought about only through education and training, and of the two I should say training is much more important. If that education and training is not going to come from our serious-minded, right-thinking older employees, and our supervisors, whence is it to come? I have always believed that if I were the head of a department employing a large number of men, if I were a shop superintendent or a master mechanic, and a man was injured, especially if he was a young man in the service, when he was able to go back to work I'd bring him up to my office, ask his foreman to come along and to complete the family circle I'd bring in the general foreman. I'd let the workman tell me exactly how he was injured. I would develop by a set of questions just how much time his foreman had ever given him in the way of instructions, or training, or coaching. I should particularly want to know if the foreman had ever shown enough interest in him to invite him up to his house some night, saying, "I have a book, or a set of books I'd like to loan you, which will help you towards a systematic course of study, by means of which you may improve your condition." I should like to develop what constructive help of any kind had ever been given that young man by his foreman or his general fore-

man, since the day he came into the service, and in 99 times out of a hundred you could put it in your eye, because there hasn't been any.

From this point I am going to talk from every angle of railroad service which, of course, includes safety. Our principal task as I see it, in fact, I firmly believe that the biggest task confronting the management of American railroads today is to change the mental viewpoint of their men. I feel that our biggest task is to get men to think right! I have preached for years on our railroad that the very first essential of a good railroad man, which is equivalent to saying a good safety man, is that a man must think right; no man can think crooked and work straight.

I don't want you to think from anything I say here that I belong to any particular cult, that I believe in any particular creed, because I do not! However, I was privileged a few weeks ago, to hear a wonderful lecture by a gentleman who, I afterwards learned, formerly had been a Jewish Rabbi. I will say for him, he was one of the most scholarly and cultured and learned gentlemen I have ever heard talk. He built his hour and a half talk on this statement:

"The greatest of English writers, William Shakespeare, said: 'There is nothing either good or bad, but thinking makes it so.' For years the world has recognized this as a truth because, in an old Hebrew proverb we have, 'As a man thinketh, so is he'."

THE FALLACY OF A WRONG MENTAL ATTITUDE

I have heard both quotations scores of times but because of my mental capacity being unable to grasp their full meaning, they had gone over my head, until this gentleman gave me my first insight into their real meaning when he asked this question: "If, therefore, thinking is the cause of all results; what kind of thinking is it that produces good results, and what kind of thinking is it that produces bad results?"—a question so simple that a five year old child might answer it. His reasoning, to me, is very sound. If it is true, and I am convinced it is, I contend that it must be your duty and mine to make the men with whom we work realize that if a man would be happy in his every day work, if he would be happy in his relations with other men, if he would be happy in his own home—and we must be all of these things, if we are to be strong as individuals and strong as organizations—we must cultivate the habit of thinking useful, beneficial and good thoughts and exclude from our minds thoughts that are useless, harmful and bad. When I say good thoughts, I don't mean pious thoughts at all. I mean thoughts that are uplifting and fair.

Our vice-president, to whom I report, finding that statement in a talk of mine not long ago, wrote me, saying: "I don't believe what Shakespeare and you say is true, for the very simple reason that there are many things that are inherently good or bad and no amount of thinking will change their complexion."

It isn't always the prudent thing for a man to argue a matter with his superior, but I took the liberty of replying to his letter by saying: "What Shakespeare meant (and I am mentioning this only because of the fear that the same thought may come into your minds) as I see

It is this: so far as we *personally* are concerned, a thing is either made corrective or corruptive by reason of *our* mental attitude toward it. In other words, a thing becomes either helpful or harmful to us as our thinking makes it. I don't believe that bad thoughts are any more apt to grow in a properly cultivated mind than weeds are apt to grow in a properly cultivated field." I contend that our lack of attention and consideration in showing new men who come into our service, only serves to increase the fertility of the soil in the field that we turn over to the man with the extreme views, the radical, and in connection with that statement, I would remind you that it is not your conservative, loyal employee who talks to, who offers the new man his kindly advice and help, not at all; that type of man never opens his head to the new man, the man who does all the talking is the radical.

I claim that improved thoughts are like improved living conditions; they are like a daily shave, like a daily bath. We people who have in our homes every modern convenience would think it impossible to go back and live as our parents and our grandparents did; we would think we were being trained for the hobo squad if we had to go back to that time. When, in spite of my youthful appearance, when we shaved only Wednesdays and Saturdays. The man who enjoys as much as anything his daily ablutions in a modern tub would think it impossible to go back to that day, which, again I remember very well, when on Saturday nights only we went down in the cellar and brought up the family wooden wash tub, put about two inches of water in it, and stood it in front of the open oven door of the family cook stove. Our forebears tolerated that sort of thing because they never dreamed of anything better. I don't believe the man who is thinking wrong thoughts always does it maliciously, wilfully; I believe that much more often than not he does it because he has never been taught differently, has never been taught the sheer beauty of right living and right thinking.

THE HANDICAP OF A WRONG MENTAL ATTITUDE

One of the most serious self-imposed handicaps with which a man can burden himself is the wrong mental attitude towards his work. By it he can become a chronic grouch; he can become a human crab, he may acquire habits of irritability and pessimism that will make him generally undesirable among his associates. Yes, and I believe it is even possible for a man to bring about a physical disability by reason of his indifference, his resentfulness, and his feeling of distrust of everybody about him.

I have no wish to bring any indictment against any particular class of railroad service, for the very good reason that I don't believe the mental attitude in any one department is vastly different from any other department.

As proof of my statement that good thoughts bring good results, I want to remind you that two or three years ago following a long period of conferences, and in some cases actual wrangling, between the management of the American railroads and the so-called Big Four organizations,

new agreements and contracts were worked out and I know, because I have been told by thousands of members of those organizations, that they immediately took a new interest in their job, because of their feeling that maybe, after all, there was a disposition on the part of the management to be fair with them.

They were given a little here; they had to give a little there, but the net result was quite satisfactory to everybody, and the men went back to their work with an interest, relish and enthusiasm that they hadn't felt for a year.

In 1920, 1855 train yard or engine men were killed on American railroads. Upon the completion of new working agreements the old fog of dissension and distrust that had settled over the minds of these men all over this broad land of ours was lifted like a fog, and the next year there were only 1,032 such railroad men killed, a decrease of 823 or 44 per cent. It was that circumstance that caused the Brotherhood of Railway Trainmen to show a net reduction in a year of \$485,000 on claim payments; it was that which let them grant an increase of 35 per cent in the amount of their insurance and without additional cost to the insured. The same reduction that was in evidence in the year 1921 continued during the first half of 1922, and it is part of my story that I have no knowledge of a single large railroad that does not show either a noticeable, a marked, or an alarming increase in the number of casualties among train, engine and yard men following the first day of July last year. That I am willing to confess on our own railroad our injuries among trainyard and engine men in the last six months of last year as compared with the first six months of the same year, show an increase of 91 per cent; there is a very nice problem in psychology right there. I want to ask you seriously just as I have asked nearly every organization man on our railroad, if you do not regard it as a very great pity that we are so lacking in poise, so lacking in fairness to ourselves, so lacking in strength of character, or whatever you want to call it, that for the privilege of allowing our sympathies to run away with us, we are willing to pay with an increase of 91 per cent in the number of our own fellows, our own brothers, who are being crippled and killed, right on our own railroad.

YOUNG MEN MUST BE OPTIMISTS

I claim that we must make optimists out of our young men when they come into the service. One of our superintendents a few days ago asked if I had heard the latest distinction between an optimist and a pessimist. He said a pessimist is a man who puts two and two together and gets four. An optimist is a man, he said, who puts two and two together and immediately gets 22.

I was walking through one of our yards a few weeks ago with an assistant superintendent, who called a young fellow over to us, and introducing me, said, "Mac is the youngest conductor on this division" (which happened to be the largest of our twenty-seven). He added, "McMahon

passed his examination yesterday, and a very good one. He came up this morning, and I have just given him his punch, reports, and hat checks, and he is a full-fledged conductor."

I said, "Mac, that is a very nice distinction you have, that of being the youngest conductor on this division, but has it ever occurred to you that that is a distinction you can't keep very long; do you realize there is one thing you can be as long as you stay here?" He said, "What is that?" I said, "You can always be the *best* conductor on this division," and a few minutes later when he shook my hand and left me, I felt amply repaid for the momentary interest I had taken in that young fellow. He said to me, "Mr. Hale, I wonder if you know just what that chance remark means to me? Some day, you are going to hear me spoken of in that very way, as the *best* conductor on this division!" You know and I know, that young man is going to come nearer being that very thing than if I hadn't given him something to think about.

I remember reading a good many years ago, something like this: "Our thoughts, more than any other agency directly fix our status in life." Our mental attitude towards our work or our aim in life has everything to do with what we actually accomplish. I have been telling our foremen that it is part of their job to make our men, our new men especially, realize that the man who goes to his work with the attitude of a slave, lashed to his task, who sees in it only drudgery, who sees no light ahead, only poverty and hard work as long as he lives, who thinks he is destined to a hard existence, that the Fates have been unkind to him, and a lot of bunk of that kind, that the good things of life were all meant for someone else but not for him, has no reasonable right to expect to find as he goes through life anything other than just what he is looking for. If he is looking for the worst of it, the worst of it is the best he will get.

And I contend it is part of their job and yours, to make young men realize that if they will believe in and actually see a better and brighter future; if they believe that some day they are going to rise above humdrum work, that some day they are going to get out of the basement into the living room of life where comfort and happiness awaits them, if their ambition is clean cut, if they keep reasserting their belief in their ability to accomplish what they have undertaken, they are sure to make a success out of life.

I used to ask our men to fix a definite goal in life and then keep shooting at it until they accomplished it, then set another goal and keep shooting at that. I have changed my viewpoint. I believe that if you fix your mind on something an indefinite length of time ahead you are apt to overlook your opportunity of today.

LIVE RIGHT TODAY, AND TOMORROW WILL TAKE CARE OF ITSELF

I am now trying to get our men to see that today is all they know anything about, that if we live today rightly, tomorrow need offer no vexing problems.

I tell our young men that the fellow who regards as hopeless his chance in life, who is constantly marking himself down in his own estimation,

putting a low valuation on himself, hasn't any right to expect to meet any man who is going to take the trouble to mark him up or put any higher valuation on him than he puts on himself. I say to you, I dare any man to tell me any reason why a man should expect to meet some other man who is going to take the trouble to do for him something that he is too lazy to do for himself.

Any man who has ever worked in an organization of any kind knows that all the conceit, boastfulness and generally swelled ego is not confined to the offices of our managers and superintendents as many men contend, and you know and I know that if all the men on your property and mine were putting in at hard work the time they are now spending telling what they would do if they were in the boss's place, we'd have lots more successful men than we have now.

The realization of a person's ambitions, his advancement in responsibility, the acquisition of those things he values most in life, the respect and confidence of his family and his friends—and most of all, his own growth—are all dependent on his mental attitude towards his job. I am telling our young men that if they do not like their work, if they don't enjoy doing it, in fairness to themselves they ought to make a change, because there is work somewhere that they can and will enjoy, and they will never be either happy or successful until they find it.

It is a part of your job and mine to help get a good many of the square pegs out of the round holes in which we now find them. I contend that if you can get the minds of your men into the groove of right thinking, you may forget all about the upturned nails. Due to wrong thinking, there is too much counterfeit labor being offered to many in exchange for good dollars; counterfeit labor reacts on the man who offers it in trade, and in time he becomes exactly what he thinks and acts—he becomes a counterfeit himself.

It must be a part of your job and mine to try to make the men among whom we work realize that the man most likely to succeed is the man who works, not merely for the money he gets but for his own good, who works for a stronger personality, who works for a sturdier character, who looks upon his job as a means of making himself a better man, a more worth-while citizen and all this by being honest with himself and his employer.

I contend that it is your duty and mine to make our men realize it is the positive, constructive, affirmative attitude of mind alone that will carry a man forward, that it is the man who takes hold, who builds up and doesn't find delight in tearing down something that other men have painstakingly and laboriously built, who steps in wherever he is wanted or needed without waiting to be asked or without looking at the clock, that wins promotion; I am reminding them that never have they heard of promotion going to a critic or a fault finder; I am telling them that while I hold no brief either for or against an eight-hour day, no man ever climbed very high on the ladder of success who confined his climbing efforts to eight hours a day. I don't mean by that I would

have a man stay in the shop over eight hours; not at all, but rather I would ask what is he doing with his hours outside of the shop when he is not getting necessary recreation and rest? It is what a man is for, not against, that will open to him the door of opportunity.

In my job, like you, I am sort of a father confessor to a great many men; they come to me with their confidences, some even tell me their troubles. It seems as though nearly every day some young fellow comes to me and cries that he has no opportunity. I tell him he may cry about his lack of opportunity until the crack of doom, but it will never change one bit the fact that a man's only main-spring is inside of him and not outside, and nobody in God's world can wind that main-spring and keep it wound except the man himself!

I realize that this is not something that can be brought about over night. I know it is something that cannot be brought about through a correspondence school course; this, for the very good reason that the man who is thinking wrong thoughts is quite happy in the belief that what he knows, he knows, and has his mind made up that no one is going to change his opinions. I am not even prepared to argue that we may not have to educate another generation of men, but I contend that the time for us to begin to build is now.

BETTER MEN MAKE BETTER ORGANIZATION

I am asked quite frequently, "How would you keep your full quota of men if you were going to be more discriminating in picking them, and more exacting after you got them?" I believe that is a situation which happily would solve itself. I believe, speaking for our railroad, that if it became known among the railroad men of this country that we people on the Santa Fe were trying to build, not merely an organization but a super-organization, we would at once create in the minds of the very finest type of railroad men everywhere, a wish that they might get into Santa Fe service where they could work in an organization of that kind, and where they might raise their children in what they knew would be the wholesome atmosphere surrounding such an organization.

It must be our duty to get serious-minded, right-thinking men, and supervisors especially, to use their influence to get other men to quit thinking those unfair, unwarranted, and sometimes, actually vicious thoughts that are robbing them of a peace of mind they otherwise might enjoy. Wrong thinking is not confined to any one social or industrial strata; regardless of the direction you turn or the distance you go you will find inactive and misdirected minds. One of our greatest faults is that too many men know too many things that are not so.

I picked up a paper a few days ago, and read that the Italian Ambassador at Washington had been given a banquet the night before in New York by the representative men of that city. Seated next to the ambassador, as a guest of honor was a New York contractor who was invited because it was he who gave this Italian immigrant his first job in America not many years ago, that of pushing a wheel-barrow in a construction job in a New York subway.

This gentleman did not get there as ambassador from the Italian Government by a process of wrong thinking, by a wrong mental attitude towards his opportunities, nor by waiting for some other man to do for him what he was too lazy to do for himself.

Years ago, when I was chief clerk in a railroad office out in Omaha, a young fellow came into my office, a tough little guy, who came swaggering up to me and said, "Are you Hale?" I acknowledged I was. He said, "I have got a pal who is working for you, and he tells me he is going to jump his job Saturday night. I just came up to ask you if I can get it, see?" One question developed another, and I found that he was working as an elevator operator for \$40 a month; when I asked him how much schooling he had had, he said, "Nix on the school stuff, boss. I haven't had any. My father died when I was nine years old; I had to leave school and go to work, and I have had to work ever since; I'm sorry, but you can't count on me knowing anything learned in school, but I'd like to have that job. Give me one crack at it boss." I said, "Listen, my boy," (because I had even then begun to like him) "this is a clerical job you are asking for, and yet you tell me you have no education. Do you believe you can do the work?" He leaned over my desk and looking me straight in the eye, said very seriously, "Has anyone else ever done it?" I said, "Yes, certainly." Very greatly relieved, he said, "All right, then I can do it."

I said, "I will take a chance on you," yet down in my heart I knew I wasn't taking any chance at all, "You come down here Monday morning and I will give you \$45 a month," and when he went out of that office he was so happy he had to turn sideways to get his smile through the door.

HOW SELF CONFIDENCE ENABLED YOUTH TO OVERCOME MIGHTY OBSTACLES

He came to work for me and was there a year and a half when I got an old-time friend of mine with a packing house in Chicago to give him a job.

Before he left Omaha, I said to him, "Jack, because neither of us know what you are up against over at Chicago I am going to hold your job here 90 days; if you don't make good, come back." When I offered him a round trip pass he said to me, "Surely you don't understand what this chance means to me; I'm going to Chicago for only one purpose, to make good; therefore, tell me, what do I want with a return pass?"

I was in their offices just a year and a half from that day, and meeting the department head for whom this young fellow worked, among other questions I asked was, what salary he was getting. "In fairness, I should tell you he is worth \$10,000 a year to us, but because we have spoiled so many young fellows over here by advancing them too rapidly, we can't take a chance on spoiling him, so we only give him \$5000," the department head said.

I lost sight of him for 16 or 17 years, except at Christmas when we sent each other our cards, but two years ago this month I met him in Los Angeles and found he was with a Wall Street concern, the strongest

financially of any bond house in the world. I had no hesitancy in asking him any purely personal question, so I said, "Jack, what do you earn?" He said, "My earnings vary." I said, "All right, what did you earn last year?" and very modestly he said, "A little over \$40,000."

I never knew a character just like him. He hadn't a great many of the qualities that are generally regarded as essential in business success, but he had something that was worth them all. He had the most supreme confidence in himself of any one I ever knew; he lived the cleanest life of any young man I ever knew; he was just as strong physically as he was mentally, and if he wanted to he could have gone into the ring and been the best man of his weight of his time.

One of our greatest troubles today is, the minds of men are so filled with the thought of getting something for nothing that we are sitting around waiting for the world to make good. I am telling our young men that this world doesn't owe them a living or anything else. Whatever obligation there is is on their part and not on the part of the world. Elbert Hubbard never said in all of his wonderful writings, a truer thing than this: "I am today what I am because yesterday I was what I was." It is nothing short of tragedy that men should accomplish average before we finally realize that no man can take out of this life or out of his job more than he puts into it.

I have no wish to appear vulgar, but I want to remind you that success is not at all a question of luck. Success is merely a question of the proper intestinal investiture, if you please. If you are properly equipped in that way you will be successful, and if you are not, you never will be in the world.

TRUE SUCCESS IS BASED ON TRUE FRIENDSHIP

Mere money is not a mark of success; unless a man uses his time and his effort and his money (if he has any) to bring help or added comfort or greater happiness to some one other than himself, he is not a success. One of the most wonderful privileges in this life is that of friendship. Lately I have been trying to drive home to our men something of what friendship really means, and I want to read you something along this line, because it will give you something to think about.

"What is friendship? Somebody has described a friend as whoever by preference promotes the welfare of another. The description is worth thinking about, and would be interesting to apply.

"A wife is her husband's friend, a husband is his wife's friend, and a father and mother are their children's friends. Friendship is a mutual affair. Our friends are glad to help us, and we in turn must be glad to help them; otherwise there will be no friendship, because true friendship is not one-sided. The least any fellow can do is be a friend to the chap who is a friend to him, and the better friend a fellow is to us, the better friends we ought to be to him. Every fellow's best friend is entitled to that fellow's very best friendship. But who is every fellow's best friend? Who pays the rent and buys his clothes, and settles with the grocer, the butcher, and the doctor—who is it that finds new hats

for the wife, and shoes for the children? You and I and the other fellow have a lot to be thankful for. We not only have the necessities, but many of the luxuries of life, but where did we get them? Why, we got them from our Job!

"Has any man any better friend than his job? Does any friend do anything more for any one of you men than your job does for you? Isn't our job pretty nearly our best friend, and if a man's job is good to him, is it any more than decent for the man to be good to his job? And if the job is the best friend we have, isn't it just ordinary every-day fair play for us to treat the job like a friend and be good to it?"

"Did you ever know a man who made himself a success who did not recognize that his job was a friend, and show himself to be a friend of his job?"

It is the way of the world but too often we do not realize what our friends mean to us; we do not realize what a very vital part they play in our lives until such a friend has passed on and is gone.

In traveling over our railroad, I frequently meet a man who was formerly in Santa Fe service, and maybe for a long term of years, who is now out of it, and who tells me that he never realized that his job was the best friend he ever had until he lost it.

PUBLICITY AS AN AID TO THE RAILROAD SAFETY OFFICER

ROY D. WRIGHT, MANAGING EDITOR, RAILWAY AGE, NEW YORK CITY

The question of publicity is a tremendously important one in these days. Publicity men the world over, are beginning to realize that they have got to approach the situation in a more scientific way than in the past.

Let us remember that at the most conservative estimate, 75 per cent of our accidents are due to non-physical hazards, they are due to mental hazards such as absentmindedness, carelessness, and things of that sort, and the way in which we are going to overcome the greater part of these hazards is through educational processes. I have spent quite a bit of time trying to get a real good definition of publicity, because publicity is a thing that we have got to use in order to carry on this educational campaign, and I found that a man named Higham in England, gives us this definition: "Publicity is the partisan of truth. True publicity sees principles in their right relations. Publicity in the long run becomes a moral force. The right kind of publicity breaks up crusted prejudice, and sows the seed of truth."

Now, if we are going to create this great moral force in this day and generation, we can't do it with so-called propaganda. But we have got to have facts, and we have got to marshal those facts in such a way as to create a real impression if we are, as I say, to create this moral force.

If we are going to get these facts and marshal them in such a way to produce an impression, just whom have we got to shoot at in this great American commonwealth? I imagine most of us are familiar with the army mental tests and the astounding revelations they made to us. Think

of it, of over 1,700,000 men examined in a period of six months, 41,000 of them officers, five and one half per cent were rated with a very superior intelligence, nine per cent with a superior intelligence, and sixteen and one half per cent with a high average intelligence. Now those three classes cover just 30 per cent. The next is average intelligence, 25 per cent, and the statement is made that very few of that 25 per cent had sufficient intelligence to pass a high school examination, or to take a high school course. Now this isn't a test of knowledge, mind you, this is a mental test, and only 30 per cent of them were mentally equipped to take a high school course. Very few of them, indeed, below that 30 per cent were fitted for that.

Now these are only mental tests; discount them 50 per cent, and is the situation not astounding? Let us agree also, if you will, that railroad men are of a higher average intelligence than others, although I question that when we take the railroad employees as a whole. We still have got to recognize the fact, men, that if we are going to reach and make a real impression upon the rank and file, we have got to direct our publicity in such a way as to get down to a fairly low standard of mentality. We have got to arrange our facts and marshal them in such a way as to reach pretty well down, and an awful lot of safety publicity I have seen is entirely too high brow, it is going over the heads of a great percentage of the men we want to reach.

AVERAGE, NOT SUPERIOR MENTALITY MUST BE APPEALED TO

One of our great newspaper publishers is said to have given orders to his editors to prepare their material and put it in the paper so as to appeal to a mentality of 12 years of age. Can't we take a great lesson from that publisher, who today is reaching great masses of our people, and I might say, with not always the best sort of things?

There are a few things that we must then keep clearly in mind. We must make our statements clear and simple. We have got to watch the newspapers and pick out things which are making the strongest appeal to the greatest number of people. Study their methods and utilize them so far as we can. We can't turn out a great mass of type without dressing it up and expect to reach the men. We have got to make free use of pictures and cartoons, remembering, however, that with the cartoons and the pictures that we don't want them to go over the heads of people. Sometimes we see some cartoons that would make a college graduate scratch his head and wonder what in the world the fellow is shooting at. Let us not use that kind of a cartoon.

Then we have got to present things so far as we can in a graphical form, because that seems to be the thing that today is making the largest impression.

We have had some splendid safety pictures that have been put out to appeal to the public, and that one which has been displayed so widely during the past summer, that colored picture of the highway crossing, has made a great appeal. We need more of that sort of thing.

Mr. Wöllner, the Chairman of your Program Committee, recently wrote an article on the use of charts in safety work. I want to quote just one or two things that he said, because he has been successful to quite a degree in the use of these charts. He said, "Among other things, it is practically impossible to present the need for safety without using a great many things showing the frequency with which accidents occur, and the benefits that occur from the observation of safety rules. Remember this: That statistics are always boring to an audience, and then again it is necessary to use so many figures, it is impossible for the audience to retain them in their minds with sufficient accuracy to use them, should they desire to do so." On that basis, he suggests the use of charts, and he warns us against certain kinds of charts, and he recommends one kind—that which shows the horizontal or vertical blocks, blocked in black so that they stand right out, and not use curves and circles and that sort of thing. Then he makes this observation, and I want you to think of this now in the light of those army statistics. "Plan the charts to suit the group that you are appealing to. Some of your groups can follow charts much more easily than others. In some cases, it is going to be a mistake to use a chart at all."

Keep that in mind, and then there is one other thing that is true in publicity work, and that is, show as little as possible on it, or one thing; emphasize one thing rather than attempting to show many things.

I think also, we can take a great lesson from some of these graphical charts that are being shown in the movies in these days, and we ought to be able to adopt the best of their ideas to our own use. These moving picture people are studying great audiences, audiences representing a cross section of all our population, and they find that sometimes a thing doesn't get over, and then they find again, another thing does get over, and we ought to profit from the observations and the progress they are making in studying these graphical charts.

SELLING SAFETY TO THE MAN ON THE FIRING LINE WILLIAM N. DOAK, VICE-PRESIDENT, BROTHERHOOD OF RAILROAD TRAINMEN

Those who have made a study of the psychology of salesmanship tell us that the first thing in order to be a successful salesman is to have faith in the product offered for sale, and that the second most important thing is to know human nature, especially that part of the buying public with which one is doing business. If this is true in selling merchandise, then I am fully convinced it is doubly true of those to whom is entrusted the duty of selling the far more important thing, safety to the men on the firing line. It then unquestionably requires more patience, study and tact to be a successful salesman in the safety movement than that required of almost any other business or professional man. By the same token, it will require a great deal of tact and skill on the part of any one in attempting to state new ideas or thoughts to you experienced Safety men if we do not cover the ground already gone over by you in your efforts.

I come to you from the men who face the dangers, endure the inconveniences and hardships incident to conducting transportation on all the steam railroads on the continent. Then men who, regardless of climatic or other conditions must respond for duty and faithfully discharge those duties in order that we may have a highly developed and properly working transportation system; the men who constitute that great army of train and yard service, employees who are among the most important in our industrial life and on whom rests so much of the responsibility for the success of this great industrial machine of this, the greatest country on earth. It is almost beyond comprehension when viewed from the standpoint that almost all the raw material, finished products and traveling public must be handled by these men. Yet they are about as successful, and many times I believe more so than any other class engaged in industrial activities in our confines. This bespeaks great training, constant co-operation and years of education and endeavor to cope with the purely human element of the institution itself, to say nothing of the other factors that enter into the industry.

THE NECESSITY FOR CAREFULNESS

In order to be most helpful, those of us who have given any thought to the subject are convinced that the most important step in this movement is to impress upon all the absolute necessity of being careful. Careful not only in action and deed but as well in thought and speech. An unfortunate spoken word or harbored thought oftentimes leads to heartaches and hardships. A careless act on our part often causes anguish of mind and agony to ourselves or others. A deed committed is beyond recall, and may be the cause of pain or untold future suffering. Neither need be of a premeditated or malicious character, yet the effect may be just as far reaching and injurious.

In carrying Safety to the men to whom Safety is a most valuable asset and an ever present need, we should exercise care and discretion in order that the thought may be conveyed as well as the act, the spirit as well as the intent, and that the heart goes with the act as well as the deed. Influence is a world factor in any line or endeavor; it is the foundation of faith, and faith works wonders not only in social intercourse but in industrial relations, as well. Then I would couple up as the very first step the principles of honesty, trust, and faith in the fairness of all mankind, and from this viewpoint proceed to build the superstructure of safety in the railroad business.

We must trust one another; if so then why should we not begin charity at home by doing that only which merits trust and confidence? We are firmly convinced that in order to be successful salesmen of safety the prime essential is to be worthy of the trust that we expect men to place in our endeavor. If we live, think and act in a safe manner, then our example so shines forth that others, seeing our good works, follow. On the other hand if we preach safety and live carelessly, we become the proverbial hypocrite. This lessens our prestige and almost, if not entirely, destroys our efforts. This brand of salesmanship is more than lip service,

more than mere declarations or declamations, more than minor efforts; in fact it is an enormous task and requires high courage and strong effort.

ATTRIBUTE OF SAFETY MOVEMENT

Right living, right thinking, right working and right playing are some of the attributes of the Safety movement. We have more interest than the mere effort to teach carefulness insofar as our bodies are concerned; more in common with humanity than to teach men to look out for their physical needs and wants—we have the higher duty of creating in them the interest in all humanity, that of looking for the best in our fellow men and helping them to express these good things.

More serious are our duties and responsibilities than ordinarily thought. We must search and reach by honest endeavor the heart and conscience of those we strive to help. Safety among those engaged in the operation of trains is most essential and all important. There can be no faltering, hesitating or escaping the responsibilities by these men, and there should be nothing left undone to throw around them every safeguard in their employment. Co-operation, respect and properly placed confidence must prevail all along the line, from the top to the bottom, from the chief to the lowest in rank of the subordinate.

We should direct our energies toward finding the best means of accomplishing desired results in our endeavors toward ideal conditions, and we know quite well the men assembled here have devoted untiring energies toward these results, and apparently it will be a presumption on the part of an amateur to attempt to make recommendations. However, at the risk of appearing ridiculous, a few suggestions which are conclusions resulting from observation and experience are offered for your generous consideration.

THE POWER OF THE PRESERVATION INSTINCT

The first impulse of every individual is self-preservation and the protection of his loved ones. Endanger him personally or mistreat his dependents, and he ceases, generally speaking, to be a kindly personality and becomes a desperate individual. We must first reach him from the standpoint of protection, not only to himself but to those near and dear to him. An appeal of this kind never fails of proper results.

Contentment, peace of mind, security in employment, good wages and proper living conditions are prime essentials in the accomplishment of results along sane, sensible safety lines.

The peace of mind of the individual plays a more important part in our successful endeavors than one may imagine at first glance. Worries of any character will no more mix successfully with railroading than will oil and water. Many things may cause worry or disturbed condition of mind. The more frequently brought to my attention are those concerning the administration of discipline and the personal handling of employees by superiors. An invariable barometer of railroad success, insofar as transportation men are concerned, is established in proportion to the reasonableness and fairness with which discipline is admin-

istered. Train delays of apparent unnecessary duration, partiality and favoritism, together with over-zealousness on the part of officers and fellow employees, many times tend to disturb the peace of mind of employees, and as a result carelessness and indifference follow with the attending accidents, resulting in injuries, death, or property destruction. Weed out elements of discord as you would the tare from the wheat.

Security in employment is of paramount importance to successful performance of duty. Were each employee who is worth while, properly impressed with the fact that he is secure in his position so long as he obeys instructions, lives up to the rules and is careful, we would find the best results following. On the other hand, let employees feel that their remaining in the service is uncertain or let the impression become general that discriminations are to follow, or that there is indifference as to the employee's efforts, that he will in all probability be let out, you had just about as well suspend railroading for the time being, because this is not only unprofitable but extremely dangerous. Give the best assurances of permanent employment provided care and discretion are exercised, and the best results are obtained. Above everything, eliminate the feeling of "It's hell if you do and hell if you don't." This spirit will not only wreck your safety efforts, but as well, the success of your industry.

Good wages, properly and discriminately distributed in such a manner as to compensate in proportion to the services performed, are of such magnitude that we may well turn our attention to them as having the most telling effect in the operation of trains and the general Safety First movement. Your safety men should lend your every effort toward a just, equitable and adequate wage adjustment. No railroad men may reasonably be expected to work for wages that are insufficient to maintain himself and his family properly in accordance with reasonable American standards. Cheap, dissatisfied labor is not only a handicap to industry but a danger to our free institutions, an absolute menace to our railroads. Men must have food, clothing and a few comforts, not only for themselves but for their dependents, or they will become calcontents. Safety First principles demand that we all boost for fair wages as the best step toward responsibility, and recognized responsibility leads to safety.

RELATION OF GOOD LIVING TO SAFETY

Put your energies into the movement to furnish proper living conditions for the men on the American steam railroads. You can engage in no more laudable endeavor than to make men more cleanly, their home lives better, and their environments more wholesome. Do this and you have taken a great forward step in the interest of the safety movement. Make a man's condition of living right and you have almost without exception made him worthy of your confidence and the world's respect.

Rhetoric, oratory and academic theory advance us very little. The thing that counts most in the Safety movement is a practical every-day application of efforts. We must live safety, as well as teach it. Safety, like good wine, ripens with age, and the more we practice it, the better we like it.

Our forty or fifty years of agitation for safety legislation in the state legislatures and Congress has given the Railroad Brotherhood a fair insight into safety progress. All movements contemplating changes in thought and action are slow, and in general the Safety movement has been slow, but fortunately progressive and forward. People generally are not quick in starting reforms and are more conservative in pushing them. It is, therefore, important to educate the masses along forward thinking lines.

For example, it took fifty years of agitation, education and persuasion to enact and make fully effective the Safety Appliance Act. From the time the first resolution was introduced in Congress in 1871 until the Safety Appliance Standards order of the commission became fully operative in 1921, fifty years had elapsed—however, we fought undauntedly for this great humanitarian legislation, with unbending faith in the justice of the cause. We were sure we were right and forged ahead.

EVIDENCES OF ACCOMPLISHMENTS

There are other evidences of what has been accomplished by constantly keeping at a right principle. For instance, your own movement is a splendid example. Your Safety First movements were regarded at one time as unsound theories, or hobbies. However, recently I was told by a high official of an important railway that the best asset his line had and the biggest dividend payer was their Safety movement. Others have told me that through the good work of their Safety movements they had turned losses into profits—thus disproving the old theory of these movements being expensive. The public is also taking up the slogan, and now a splendid spirit of fraternity is springing up universally to crown your efforts.

Labor organizations, such as ours, at first looked with some skepticism upon the safety movement, but have now so far changed their viewpoint that "Safety Matters" are not only a part of their work, but an order of business in their ritual, thus making it an important part of organization work. The reason for this change of opinion is education and fair dealing. The results are written in undeniable evidence on our accident records and insurance reports—thereby proving that the movement has had tangible value to us from a purely organization standpoint in dollars and cents.

The psychology of the situation is that if the higher-ups do not tote fair why should the lowerdowns do so? Then an important part of your work is to not only advocate co-operation and good management but to prove it by results. Boosters are always live ones.

You know I never lose faith in three things—my God, my country, and my people. They are all true as steel. If you feel yourself doubting, remember that your God is always right. Were he not, you could not exist. Your country must be right, because it is your country and has withstood all the assaults from without and from within. Our people must be trusted—if our own cannot then what other people can be? The best rule to apply in case of doubt is the rule of introspection, and you will almost always find that the fault rests with you, not with others. So

when you hear people bemoaning their fate or envying every other one, apply your Safety rule of taking the safe course and running no risks with them. Get such fellows on the track, or take them off the line entirely. A disgruntled, whining individual is an unsafe railroad man; therefore fix him, set him right, or encourage him to enter other fields of endeavor. I would also recommend as part of your program the education of all in the one important principle of being fair and truthful, the Golden Rule being the very best measure to insure success. If we approach this question from the standpoint of being safe for the other fellow's sake because we, in turn, expect him to be safe for our sake, we have about solved the problem.

NEED OF CO-OPERATION

"Am I my brother's keeper," has sounded down through the ages as a hindrance to progress. It seems hardly fair to assume that people in this enlightened age of progress and advancement should ask this question, yet day by day in numerous ways it is being propounded to the world. My answer is "yes," more so than at any time in the past, for at no time has the absolute need of co-operation been so apparent. Never has there been such a demand for the practical, everyday application of Christianity in industry and every line of human endeavor. A simple little phrase of a French chemist went around the world causing humanity to think and act by its suggestion; then why should not our slogan of "Be Careful" be changed to "I am careful every day in every way," and by its repeated suggestion reach all mankind? It is worth while—I would suggest giving it a try-out.

We should all realize that there is danger in false propaganda. He who lives by the sword must also perish by the sword. Improper, selfish and unsound reports when circulated only rebound in the most harmful way. I am sure there is a great amount of harm done by the attitude of selfishness which is so prevalent by the railroads, and this in many directions. Cost is being placed above service, commercial advantage above efficiency, and profit above safety. The great masses of our people are being unduly preyed upon by the cure-all quacks who are holding forth alleged remedies to cure railroad ills. These people are just as menacing to industry as quackery is to the public health.

There are those of us who have thrown down the gauntlet and are demanding the truth and a square deal for the railroads, management and men, and we invite all to join in this campaign of education. It is believed to be an essential part of the Safety movement. We cannot bankrupt the railroads, half starve the employees, and then expect safe conditions to prevail. We do not expect any more favorable conditions for the railroads than we do for industry and the public in general, but we do expect at least half-way fair treatment. The public should not demand any more than they may reasonably be expected to give. The public demands safety—and in this demand they are right. The railroads expect to give safe conditions and generally they are doing their best. The public on the other hand must accord to them the opportunity of making good. The

reformers and dreamers demand safety in travel and in their daily endeavors—then they should practice safety in their program of reforms. No institution can, or ever has, withstood the ravages of time unless established on truth. No individual can, or ever has, succeeded long if he gained his position by unfair methods or resorted to unfair means. In your program be fair, be fearless, yet be true to the convictions of right. Measure only by the yardstick such as you would like to be measured by.

The experience gained by the years spent on the firing line, together with the others years that I have lived with the men who are constantly under fire in the railroad business, all told, which constitute a lifetime, brings me to the conclusion that the industry is of the very highest class. Management and men are the salt of the earth, and they deserve the most favorable consideration. These men, given a half chance, will develop the transportation industry of this country into the most marvelously perfect machine on earth—capable of caring for the needs of the world. They need no paternalistic agency to guide them, nor no favorable subsidy to sustain them, nor no efficiency reformers to uphold them. All they need is a square deal, the right to live, and the opportunity to do a first class job of railroading as practical railroad men.

DENIES LACK OF UNITY

An erroneous idea has been too long prevalent in this country that the railroads and their employees were pitted against each other. Of course, there has been the desire on the part of some to cause friction in the hope that these two may not unite for mutual benefit and protection. There is no industry on earth where closer co-operation should prevail than between investor, management and employee of the railroads. Their interests are common and they should be encouraged in their efforts at co-operation. The only reason they are encouraged to do other than work together is because some outsider desires to profit by their differences. In selling Safety to the men on the firing line, instill in them the spirit of co-operation and confidence.

The thoughts desired conveyed in this brief talk are simply that in the general Safety movement we should take into consideration all the elements that may tend to cause dissatisfaction, worry or other things that would tend to divert the attention of the employees in other directions or that may in any manner cause carelessness. In my judgment, we must give the most careful consideration to all factors, because anything that results in carelessness or indifference, regardless of what it may be, is the proper subject for corrective remedies by those entrusted with safety measures. We should not, in my judgment, permit cost, bias, or even ill-advised public opinion to in the slightest manner divert our attention from the real object, "Safety First."

If the public is being unduly disturbed by wrong propaganda or improper information, it should be our duty to correct all such false rumors, thereby assisting in giving the public the facts. If employees are being improperly influenced by unwholesome conditions of employment, including inadequate wages, some one must rectify this situation in the interest

of safety—consequently we cannot escape the responsibility of doing our duty. We can assist in our own way, and I am sure your Congress can do very much in the interest of common justice. Investors are entitled to a square deal in order that honest efforts are had in providing the means for proper equipment and facilities, and management must be encouraged to be able to function properly without fear or hindrance at all times.

A SQUARE DEAL FOR ALL SOUGHT

We must go out to the public armed with the love for one another and the public, holding up the banner of a square deal for all, never forgetting that the prime essential in our civilization is protection of life and limb, and that this principle extends not only to the employees and the railroads, but by the very nature of the interests it serves it reaches almost every home in the Republic. Then, in order to provide the proper assurances of safety, all interests must have every consideration, and the very essence of co-operation must prevail among all. In other words, the public should understand that in our endeavors to give to management and employees the proper measure of safety, the public is a party to these efforts and must contribute toward the means as well as give hearty co-operation in other ways.

Were we able to carry to the men on the firing line the assurances of whole-hearted co-operation and they were to know that all parties were in earnest in giving the public, the investor, the management and the men a square deal, the problem is solved. Were all to understand that every other one believed in safety, was willing to live safely, as well as talk and act it, this great humanitarian movement would reach the zenith of its glory in leaps and bounds. It then, in our judgment, is well to consider the so-called little things, for as certain as we live all things are founded on a multiplicity of small things, each working with others for the good of the whole. Clean lives, pure hearts and righteous souls, free from all selfish reasons or ulterior motives, working for the good of themselves and the advancement of their fellow men, which in the end means the edification of humanity and the glorification of God. Let these sentiments go out from this Congress, not only to the men who are employed on the steam railroads, but to all industry and to every household in every city, town and hamlet in America—you may be sure it will bring peace to all and the blessing of this great people of ours.

Go forward, my friends, with renewed energies. Reconsecrate your lives and stimulate your efforts, resolve that in this the most laudable of endeavors, the preservation of human lives and the prevention of accidents and injuries, you will use the very best that is within you. Your calling is of the highest character, your influence is the most far reaching in effect, and your example without parallel in brilliancy. Merit its high position of honor and trust by keeping the faith. Let not by any degree of temptation your aim be subordinated to selfishness, neither permit influence, pressure or social prestige to sway you one iota in your movement.

but go forward with the determination that you will serve humanity as it never has been served, devoid of any tinge of selfishness or monetary gain.

This is, indeed, a great honor and a rare privilege you have accorded me in meeting with you, and it goes without saying that my heart is with you, my every influence is behind you in your splendid work. Therefore I wish you success as a body and each individual among you that greater regard, the assurance of "Well done, thou good and faithful servant."

In closing I am reminded of that beautiful poem, Stop! Look! Listen! written by Florence G. Chapman:

"We think we can live this old life as we please,
As free as the birds of the air.
The years, they are ours to use and abuse,
Our acts, just to do and to dare.

We think it a jazz, a mad, dizzy whirl,
Who cares for a heart or a smile?
Just keep to the right—leave the laggards behind
And "get there"—live life every mile.

But Stop! Look! Listen!—the sign reads ahead,
There's a fellow out there you have known,
And a woman who loves you and stands by your side,
You can't play the game all alone.

It's a funny old world, in truth, through and through,
On the level and square if we choose;
Make the man on the highway your brother and friend,
Or take it from me, you will lose."

SELLING SAFETY TO THE MANAGEMENT OF A LARGE RAILROAD

H. A. ADAMS, ASSISTANT TO GENERAL MANAGER, UNION PACIFIC RAILWAY,
OMAHA, NEB.

Salesmanship of this character has been simplified with the light of recent years' experience which has furnished visible evidence of the saneness and soundness of the arguments behind it.

A few of the larger systems are out of alignment in this movement and "Safety First" is more of a platitude or precept than a policy with them.

No railroad management in the land can be uninformed or indifferent to the achievements of this safety plan. It is therefore evident that such roads as have not as yet awakened to importance of this work must needs be convinced by compelling arguments and silencing evidence, to bring them to its realizations.

Admittedly, officers entrusted with the management of class one railroads of our country are of broad vision, so when any of their group

fails to enlist in the cause of Safety First, it can be attributed to mis-directed effort of someone. Feel safe in the assertion that, had this plan been earlier and impressively placed before men in high places, there would be no class one carriers in the country today without its safety organization.

The extent of investment in money and men engaged in the work must vary, of course, on different properties, dependent upon the needs and the financial ability to carry on the work. We should exert every effort in our appointed places to bring the safety work to the approval of all to whom it comes automatically and perforce commend it in the strongest form to those carriers whose methods are luke-warmly prosecuted or totally in-operative.

Why the manager of a class one road fails to follow an extensive safety program suggests a number of other questions. First, "Is this manager a 'regular'; that is, does he whole-heartedly support the movements approved by the American Railway Association?" The answer usually is: "Yes, he does." Then why is his road backward in these forward-moving matters, or does it follow old style methods, indifferent to the welfare of employees and patrons?

Certainly no road is indifferent to public welfare, or to the safety of life, limb or property protection.

Again, history shows that employees themselves have in the past, urged safety devices, sometimes going so far as to inspire laws forcing them upon reluctant lines. So it follows that on roads without a safety program the operatives, seemingly, are nonchalant. Otherwise they would force the issue. When the managements do not take hold of the movement, it is clear that neither group is convinced of its essentiality.

When this is true it is an emergency and up to the men themselves to convert the management. But first, someone must convince the men who and how?—there's the question.

Prospective purchasers must be convinced that our commodity is one of necessity and economy and not the fantastic dream of a faddist. That which we offer must be of first quality which will stand opposition and become its own best salesman.

There is no argument about usefulness of the common household broom but the man of today who would distinguish himself as a broom salesman must convince us that the broom which he is selling has qualities superior to others offered by competitors.

REASONS FOR URGING SAFETY

We can urge the purchase of Safety for many reasons, but certainly for the following:

It is American.

It is based on the cardinal principle of justice.

It is humanistic. It is one of the best vehicles of the day for expressing our belief in the brotherhood of man and our acceptance of responsibility for our brother's welfare.

It is economically sound. The American Railway Association has indicated its faith in the necessity and practicability of the program. In these times carriers, having so little to offer, other than expedition when greater safety can be added, it looms large in the line of possibilities.

It makes for efficiency. Labor turnover is one of controlling importance in maintenance and operation of railroad property. "Safety First" stabilizes and makes for contentment and dependableness. There must be increased efficiency and loyalty in Safety. While Safety first should never be accepted solely on the basis of economy, it is established that in guarding against personal injuries and casualties, working conditions are bettered.

It should be remembered that Safety work is most successful when its enforcement is complete and persistent as are the exactions of other departments such as maintenance of way, maintenance of equipment and transportation. It cannot attain full working value in a limit of one or two years.

Its principles become operative and the achievements sought assured only through education and co-operation of employees and their families. This instructive effort has final fruition only when applied to large groups; greatest lasting benefits flow from consecration of the individual employees—they who leaven the whole.

On a class one railroad, with 25,000 or more employees, there must be leadership inspired to make effective this educational program and until Safety First shall have been thoroughly sold to the individual employee in the man-to-man way, safety is neither effective nor understood.

In a division organization, one might illustrate the thought in the following manner:

The superintendent, as the responsible head of the division must first be thoroughly inoculated and enthusiastic in Safety First and in addition must gradually be brought to understand that while starting as somewhat of a missionary movement it must be persistently prosecuted until it shall be the understanding and the practice, that compliance with safety rules is as obligatory as compliance with the operating code of rules.

Equipped with a thorough understanding of the mission of Safety First in all its ramifications, the superintendent will impart this thought and spirit to all his staff, each of whom, in the handling of their work, comes more closely in contact with individual employees.

FUNCTION OF THE SAFETY COMMITTEES

Division safety committees should be the charging plant, energizing and distributing Safety First vitality throughout all the arteries of the division, reaching impressively the Local Safety Committees. From these committees will proceed the individual employee whose understanding of Safety First will prompt him to work with his co-workers, and thus

we finally reach the men who form fundamentally the footing of Safety activity and progress. It is obvious, of course, that superintendents will not have a right start nor a clear conception of their responsibilities in this important phase of the work, unless the management, from the president down, is unreservedly and unchangeably committed to the cause.

; This cannot be accomplished under a passive attitude on the part of officers or men, but must have behind it, a most aggressive, uncompromising, determined policy of belief and enforcement.

Circulars, bulletins, motion pictures, rallies—all are helpful in educational work. Individual understanding and endeavor, pouring their contributions into our Safety First treasury, produce the final results obtainable only where Safety First is thoroughly understood and properly sold.

Safety First, once sold, is not enough. It must have satisfied purchasers. Experience has shown that where greatest results are obtained, there frequently comes a reaction leaving an apathetic condition, worse than before; this is a branch of our work which must dominate and Safety First will flourish only where nourished by our best thought, by our untiring activity and our never ceasing regard for the welfare of our fellow-man and the properties we serve.

To be a successful salesman of Safety; you must first be a safe man yourself, as far as humanly possible. Let us remember that there are many angles to the Safety problem, and that the preservation of life and limb is but part of the many subdivisions of the program. We shall do well to remember at all times that he who is safe in thought and safe in word can more reasonably be expected to be safe in action. By adherence to these principles we will furnish that more valuable thing, the example, which even more than the precept, will be most persuasive of all arguments to be employed in selling Safety First.

But, don't forget when selling Safety to the management, your best argument is your performance; that is, the yearly reduction of casualties, which reflects in a tangible financial asset, let alone the intangible asset which is obvious, as well as the higher morale, efficiency, contentment and happiness among the railroad's family, which follows in the channel of accident prevention. When these things are accomplished you have sold your management, unreservedly, to Safety First.

Think it; talk it; work it; prove it.

SELLING SAFETY TO THE MANAGEMENT OF A SMALL RAILROAD

**A. V. ROWEDER, SUPERVISOR OF SAFETY, DULUTH, MESSABE & NORTHERN RAILWAY COMPANY, AND DULUTH & IRON RANGE RAILWAY COMPANY
DULUTH, MINN.**

In the first place, to sell anything, you must have confidence in the produce which you hope to sell. A man selling advertising, for example, in a national magazine, or in a local magazine for a railroad, or in a

special supplement of a newspaper, has a definite object in mind. He works out the definite program of what he hopes to sell to the prospective advertising buyer.

The same thing applies to the selling of safety to the management of a small or large railroad. You ought to make a survey of your accidents, you ought to figure out what you want to do to eliminate each specific accident cause, namely: in the line of bulletins, in the line of correcting conditions on your property, in the line of holding motion picture meetings, public safety meetings for the elimination of public accidents, the matter of holding safety committee meetings, the expenditures in connection with that such as the time of the men attending meetings, dinners, cigars, and other things that may go with that program.

In addition to that, you ought to include in your program a budget system of running the safety department, the same as the ordinary department, the three standards department, the operating maintenance of way, mechanical departments, operating on practically every system in this country.

I have been operating on our railroad for over five years on a budget system. I work up, in December of each year, a program of expenditures for the coming year. That can be done from your past experience. I don't mean by that I am trying to outline the expenditures for safety that may be made to correct conditions and practices on the railroad, but to work up a budget that will cover the bulletins, the crossing campaigns, the expenditures in salary, meetings, and things of that kind.

There is one other feature in connection with the program as outlined, and that is the selling of each individual suggestion made by the man who is selling safety to the officer of your company who has under his jurisdiction that suggestion. I have always felt that when a trainman, for example, made a suggestion in connection with the conditions on our properties, it was my duty to see that every argument possible was put up for the passage of that suggestion, if necessary to the president of the road, so that it would have a good, thorough discussion and adoption if deemed practicable.

The result of that has been that we had had more than 97 per cent of our suggestions adopted, and as the vice-president of the Brotherhood of Railroad Trainmen mentioned this morning, we have gone even a little farther than the safety proposition as some railroads call it, we have gone into the matter of sanitation, welfare and working conditions on the roads.

Just recently there was an article in the Trainmen's Journal in connection with improvements on cabooses on the Atlantic Coast Line. I was glad to see that article. It is the same thing we are working for; we are working for the contentment of the men operating the trains, repairing our cars, bridges, and track on our railroad, and that is one of the biggest safety features.

SAFETY MEN SHOULD RANK WITH OFFICERS

But getting back more directly to the subject at hand, I believe that in the first instance, the safety officers should be of equal rank and meet on the same basis as any other officer of the railroad, whether that officer's position be general superintendent, or the head of the mechanical or transportation departments. The safety officers should be in on all new suggestions for improvements in the line of bridges, and buildings, equipment, and things of that kind, so that they may have an opportunity to study those improvements and sell the safety features in connection with them directly to the management.

Mr. Adams stated in his paper that the best argument you have in selling safety to the management is your performance. That unquestionably is true. No one is going to stay with a sinking ship very long. If you have the confidence in the safety movement, if you have the proper spirit and pep, and put it into the work instead of letting it drift along, you can get results such as Mr. Adams has attained on his railroad, and we have obtained on ours, and following Mr. Carrow's suggestion, I might mention that during the first eight months of 1923 we had seventy-nine accidents, that is figuring all accidents where a man has more than one day's time. We had seventy-nine accidents on our properties, with somewhat over 6,000 men, compared with 452 when we started out work in 1917, and I might also add that we have not had at any time during the past six years, an increase in accidents for any three months period. During 1923 we have been successful in going without a fatality during the first eight months to our employees, and at times handling as high as 5,000,000 of iron ore over about 90 miles of track.

There is one other point in connection with the selling of safety, and that is the matter of efficiency. I wonder whether every safety officer makes it a point to go into the shop, take the car department for example, and try to put over a real, sincere safety campaign that will result in not only a reduction in accidents, but an increase in efficiency in that department. We have a good example of that in our property where we specialized on car department accidents largely, because it was one place where we were having serious and fatal accidents, and the result has been this—that we have had only one lost time accident with 350 men employed in the car department on inspection, and most of our work is steel, 99 per cent of it, and we had only one lost time accident in over two years.

WEDNESDAY AFTERNOON SESSION

Chairman Bentley: I take great pleasure and am honored in introducing the Reverend Walt Holcomb of Cartersville, Georgia, son-in-law of the Reverend Sam Jones.

AM I MY BROTHER'S KEEPER?

REV. WALT HOLCOMB, CARTERSVILLE, GA.

There is a wonderful spiritual atmosphere in railroad circles, whether you have detected it or not. I find it in your safety magazines that a

number of you are kind enough to mail to my home address. Some of the conservative labor journals that come to my desk have that atmosphere permeating their pages, and I think that it really pervades the railroad world. Some of the highest classed, highest toned, spiritually minded men; that I know personally are among the presidents, vice-presidents and general managers of our American railways.

As I travel on the trains and meet conductors and engineers and flagmen; speak to ticket agents and drop into shop meetings, I am struck with the spiritual atmosphere in as cold, grimy a place as a shop, as an engineer's cab, or a conductor's caboose.

The spiritual atmosphere can be detected in railroad circles. I find that this is affecting not only the general public but even the pulpit. It is manifesting itself in the attitude of preachers towards your efforts and of your men toward the ministers.

You gentlemen working in the capacity of Safety Supervisors, have as high a class of men in the railroad service as you will find in any industrial pursuit in life. I don't know of any men who save their money like railroad men; that invest it in homes like railroad employees; that try harder to educate their children; that are more liberal and generous with the churches.

I believe that the greatest enemies these working men have; the men who own railroad stock; and the men who operate railroads, are the little petty politicians. They have caused more friction between railroads and the public than any other group of men. They have stirred up more strife in labor circles than anybody else.

You have had your differences between capital and labor. Your difficulties have been economic, mostly—not personal; and, when settled you have the most loyal bunch working in the United States. Because we have a misunderstanding and a fuss every now and then, that is no sign that we are not practicing the wonderful teachings of my text.

It is my humble judgment after years of thinking that if we could somehow or other just eliminate these little ward politicians, railroad men and railroads would settle their own troubles and difficulties.

When the first man disappeared from the earth, God came on the scene and said, "Adam, where art thou?" When the second man was missing, God appeared and did not ask a direct question, but an indirect one, saying, "Cain, where is thy brother?" When there was but one man, according to the story that is told, he was responsible for no one but himself, but the moment that two or three men appeared in the world, they became responsible for each other. Individual responsibility for our brother was born that day. In this complex and complicated age in which we are living it may be more difficult to fathom and ferret out that responsibility, but the railroad men are on that job.

THE NEED FOR "PUSHERS"

In the past men have led movements; in the future movements will lead men. In this Safety Movement I can't see that there is any man or any set of men in the lead. It seems to me you are all a part of it. The

movement of safety is leading the nation, rather than a few men leading the movement of safety. That is more democratic, more catholic and more Christ-like. It will eliminate bullyism and bossism from every department of American life.

A great many of our colleges today are training men to be leaders. It is better to train some to be trailers. They are going to train somebody out of a job the first thing they know. We need "pushers" rather than "pullers." Pullers pull apart and can disrupt a movement like this Safety Movement. Pushers push together and can push the Safety Movement into every nook and corner and crevice of the industrial life of America.

On the N. C. & St. L. Railway between Atlanta and Nashville, going north, I usually ride the ten o'clock train, and when I see that big old Mogul approaching, I wave at the engineer, salute the glaring headlight and say, "Old Fellow, I'm counting on you." It seems so alive that I can almost hear it pulsating back, "I'll pull you through." I go to sleep, but I can always tell when they are pulling into the shed at Chattanooga, and then I say, "One hundred and fifty miles to Nashville," and go back to sleep. Then about a third of the way to Nashville, I wake up again. I hear something tugging, going slow, and I say, "The old train is going over the Cumberland mountain." Presently she comes to a standstill. There is a little engine that stays there—it never gets down to Chattanooga—it never goes to Nashville. It gets in behind that big old train and begins to push—pushes it over the mountain. My hat is off to that little old engine that never gets to town.

I am glad of the cooperation you men have from the railroad officials and from the working men. If I had but one last plea to make to industrial workers and railroad officials, it would be for every one to be a pusher, and push this wonderful movement forward with leaps and bounds that will go beyond our most sanguine expectations.

The railroads started preaching this gospel of safety, and, cities are sending out the Macedonian cry, "To come over and help them." I see the effects of your work started in a small way, in Atlanta, Buffalo, New York, Chicago and everywhere. You know we need it here in America more than in any other nation of the world. I studied safety every where I went in Continental Europe, and I want to tell you when it comes to personal safety they have got us "skinned a mile." America, with its automobiles, is the most reckless nation in the world.

I expected, when leaving this meeting, to go to Japan, Korea and China for six months, but the big earthquake stopped me. I had a cable a few days ago cancelling my engagements in the Orient. That awful catastrophe has disturbed my soul. I was figuring this morning. They don't have those things over there but about once a century or a half century. America kills people every day with automobiles. I believe we have killed and maimed more, proportionately speaking, than the earthquake blew up over yonder the other day. If it all happened at once, what a stir it would create here in the United States. It would outquake the earthquake.

The automobile is giving us more trouble right now than anything else. Our trains have got to run across the public highway; they have a right to do it; and the automobile is the thing that is putting gray hairs in some of your heads.

You put on a wonderful campaign of Safety this year. You advertised it, gave your money, your time, and good was done. I haven't got the exact figures yet, but whatever they show, if you hadn't put that campaign on, it would have shown up a whole lot worse. Keep that in mind. But we haven't got the autoists imbued with the spirit of the text, "Am I my brother's keeper?" It is the hardest thing in the world to get it into his noodle.

North Carolina has passed a law that autoists must stop within 50 feet of a crossing, and along the side of the "Stop, Look and Listen" sign, there is another sign, which says, "North Carolina Law. Stop." Some autoists come right on up, but if they don't stop the law will stop them. If we can get that law practiced and enforced, then we are going to reduce highway crossing accidents to a minimum.

ROUND TABLE DISCUSSION

(Mr. C. E. Hill took the chair at the request of Chairman Bentley.)

Chairman Hill: The highway crossing situation is one that is second in importance only to employee casualties. I have no panacea to offer. However, we do have suggestions made to us from time to time by those who are really sincere in their desire to help, but perhaps do not stop to consider the things they are suggesting.

My thought is that we must give consideration to the situation as it exists. We have 252,000 highway crossings in the United States; we must meet the situation. There is a joint responsibility between the railroads and the public. The railroads I believe I can consistently say are making an honest effort to meet the requirements in removing obstructions to view.

Outside of switching limits I believe the best form of crossing protection is the electric flashlight signal, of which you have seen demonstration and with which you no doubt are familiar. The Signal Section of the American Railway Association has recommended that type of protection. I believe where it has been tried out it has been found to be quite effective.

I think in so far as the part the railroads of this country can play in the elimination of highway crossing accidents is concerned, the first thing to consider is crossing protection and the second, train operation. Now we will pass to the public. The public ought to be as vitally concerned in this movement as the railroads are. A statement was made in the meeting of the Public Safety Section yesterday, I believe, by one of the speakers that there are in this country 15,000 people killed and 1,700,000 injured each year as the result of automobile accidents, or at least the figures will approximate that number this year. About twelve per cent of all automobile casualties occur on the railroad highway crossings of this country. About 85 to 90 per cent of all the highway

crossing accidents we have are with the automobile. It is for that reason that we have to give the automobile the greatest consideration.

Up until 60 days ago I was opposed to laws in the various states of this country known as the stop laws, but after giving this subject considerable thought and making inquiry extending over a considerable period and working up some analysis, I have reached the conclusion that the only logical way by which we can eliminate or at least reduce this class of accidents is by having the various states throughout the country enact this "stop, look and listen" law.

THE USE OF DANGER SIGNS

Mr. R. A. Shaw: The use of advertising in conjunction with highway railroad crossing signals, in my opinion, serves to increase the hazard rather than to diminish it. The advertisement detracts from the danger ahead and the driver eventually will forget to "stop, look and listen."

It is only logical to assume that if the advertisement is a success and draws the attention of the people, the danger signal is not, and vice versa. So why join them?

I would like to cite a particular instance in which distraction at a railroad crossing caused the death of one person and the permanent disability of another. One of our leading chemists, a very keen gentleman, was driving with his partner along a cement highway between two of our plants. As he approached a railroad crossing he spied men off to one side engaged in grading for a new track with the aid of mules. Having traveled extensively in South Africa, the scene recalled to him some incident which occurred there and which he immediately proceeded to narrate to his partner. While thus engrossed in conversation, he drove on the tracks in the path of a passenger train.

My contention is that if the mules had not been there to distract his attention he would have looked cautiously both ways before crossing the tracks, as he was ordinarily a very careful driver.

Mr. E. R. Scoville: The question of the crossing watchman's disc was recently called to my attention, and I suggested it here for discussion. The present A. R. A. standard provides for a white background with black letters. The suggestion is on the question of changing the colors to red background with white letters, the reason for that being that it is well known that red is a universal danger signal. It doesn't matter to a man crossing a railroad whether he can read the words or not; if he sees a red signal that indicates danger to him.

Mr. Galaty: I can't agree with Mr. Scoville. It seems to me that we should keep the red flag or the red sign for just the one purpose of Rule 99. Everybody is familiar with the crossing signal that the watchman has. I certainly would not feel that we should make any recommendation of change.

Mr. Harry Adams: I would like to register the same objections to the red signal.

I am afraid that you are treading on very dangerous ground when you want to change the American Railway Association standard of crossing watchman's disc to appear red in any way.

Mr. Scoville: A few years ago it was the custom on most railroads to transfer to the position of crossing watchman an employee who was incapacitated for other service, but since the advent of the automobile that man is not a suitable man to be placed on a highway crossing.

The suggestion came to me not long ago that the railroads employ a traffic policeman from the city to replace the present crossing watchman, and give the crossing watchman some position where the public would not be endangered by his inability to properly handle the traffic. I would like to hear some discussion on that subject.

Chairman Hill: I really think there couldn't be any difference of opinion as to the qualifications of a watchman or flagman, and I think about all this convention could do would be to go on record to the effect that we believe there should be an improvement in this situation.

Mr. Wiley (Illinois Central): I want to say a few words in regard to the capacity of the man in the performance of the crossing gateman's duties. Upon our system we have a great many trainmen who have lost their arms in the performance of their duty. They are very vigorous and energetic and men who I believe are well able of handling the job. If we put up restrictions by stating that a man cannot work upon a crossing who has but one arm, I think we make a grave mistake.

A SAFETY DEVICE FOR WHISTLES

One of the most important agencies for the prevention of highway crossing accidents is the locomotive whistle. Indistinct, inaccurate, half-hearted whistling, the kind that satisfies the rule book and perhaps the law is not effective and, unfortunately, such whistling is all too common.

In the last few years many of the railroads have recognized that the matter of proper whistling is directly associated with accident prevention at highway crossings and have put out the following instructions:

1. The whistle signal for railroads shall be two long and two short blasts.
2. The blasts must be of sufficient duration so that at least nine seconds elapse between the starting and the completion of the signal.
3. The blasts must be properly spaced.
4. The whistle valve must be opened so that the full volume of sound is produced.

The question is, how can we obtain loud, clear, accurate and unfailing highway crossing whistle signals, signals that the autoist cannot fail to hear? The answer is obviously a mechanical device. Such a device has been fully perfected and is now in use. The mere pressing of a lever, involving only a fraction of a second of his time and no more physical effort than pressing the button on a kodak, starts the device to operating and it blows a crossing whistle of predetermined kind and duration loudly, clearly and accurately. At the same time the bell, which is interconnected, automatically rings and continues to ring until the crossing

is reached and passed. Some roads use what is known as the nine second whistle, occupying nine seconds of time from the start of the first long blast to the completion of the last short blast. Other roads have a standard of 13 seconds. The device referred to will blow any signal that may be desired.

The device is so constructed that while the steel plate is revolving air, automatically supplied to the air bell ringer so that the bell begins to ring as soon as the whistle begins to blow, and continues to ring for a considerable time after the whistle has ceased to blow. This complies with the usual legal requirement that the bell shall be sounded until the crossing is passed. And all of this is accomplished by the slight and almost instantaneous movement of the engineer's hand in depressing the operating valve. He presses the button and it does the rest—blows the crossing whistle loudly, clearly and accurately and rings the bell.

This device has been in use for nearly two years and has been tried out on both steam and electric railroads. What few defects developed in the earlier models have been corrected. The attitude of the engineers to the devices has proved interesting. Almost universally their reaction has been favorable as they feel that it will not only relieve them of a considerable burden but will remove a potential cause of friction between them and their superiors. About the only criticism that has been urged is that when this device is used the whistle makes too much noise, and this is not a criticism which will condemn it in the mind of executives, operating officers or safety committees. One enthusiastic engineer has described in detail how the device saved the life of a switchman. This switchman was so busily engaged in his work that he did not notice the approach of the train. The engineer touched off the automatic whistle and then had both hands free for the throttle and brake valve. He is firmly convinced that the seconds thus gained saved the switchman's life.

THURSDAY MORNING SESSION

THE NATIONAL COST OF RAILROAD ACCIDENTS

LEW R. PALMER, CONSERVATION ENGINEER, EQUITABLE LIFE ASSURANCE
SOCIETY, NEW YORK CITY

When one realizes that the railroad industry of the United States involves approximately two million employees (2,072,971, year 1920) it becomes evident that railroad safety is not only a *railroad* problem, but is unquestionably a national problem; and all can view with deep interest the splendid work now being done along preventive lines by the various railway units throughout the country. This very large exposure in a comparatively hazardous industry naturally carries with it a correspondingly heavy toll of accidents, and it is fortunate that there are available, through the Interstate Commerce Commission, relatively complete statistics, which should assist railroad safety men and their respective managers in promoting preventive measures.

PASSENGERS, EMPLOYEES, AND OTHER PERSONS KILLED IN REPORTABLE STEAM
RAILROAD ACCIDENTS IN THE UNITED STATES FOR FIVE-YEAR
PERIODS FROM 1889 TO 1922, INCLUSIVE

Five year period	Number of persons killed	
1889	Passengers	1,464
to	Employees	12,364
1893	Other per.....	19,752
Inc.	Total	34,680
1894	Passengers	1,118
to	Employees	9,146
1898	Other per.	22,063
Inc.	Total	32,327
1899	Passengers	1,470
to	Employees	14,010
1903	Other per.	26,391
Inc.	Total	41,871
1904	Passengers	2,328
to	Employees	18,861
1908	Other per.	31,205
Inc.	Total	52,394
1909	Passengers	1,509
to	Employees	16,944
1913	Other per.	31,896
Inc.	Total	50,349
1914	Passengers	1,217
to	Employees	14,238
1917	Other per.	32,920
Inc.	Total	48,375
1918	Passengers	1,381
to	Employees	11,238
1922	Other per.	22,924
Inc.	Total	35,543

Of these I. C. C. accident statistics Dr. Lucian W. Chaney says in a recent publication: "No other American industrial group has been recorded with equal completeness for so long a time. The most significant column is that of employees killed. While the number is irregular, it shows a distinct tendency to decline, which would be conspicuous if it were possible to relate these occurrences to the greatly expanding volume of employment during these years. The very great increase in injuries until about 1916 in part is due to the expansion of railway operations and in part reflects a more complete recording than was possible in earlier years. The number of 'other persons' killed bears startling testi-

mony to the steady increase of hazard to the general public from the grade crossing. A very large part of these casualties are due to the growth of automobile traffic."

Chart 1 has been developed on a five-year basis, and the importance of railroad accident prevention is emphasized by the magnitude of the figures shown. Chart 1A gives the totals for 36 years, 1888 to 1923 inclusive. The fact that these accidents have occurred over a period of years and are an accumulation of relatively small day-by-day casualty lies—as is the case in general with our industrial and public accidents—is no doubt responsible for their passing more or less unnoticed as compared with tragedies such as that which has recently befallen Japan, arousing the sympathy of the entire civilized world in the appalling loss of life. It would be unpardonable to speak lightly, in any sense, of this terrible catastrophe, which was unforeseen and apparently unpreventable. But does it not serve to bring home to us the amazing fact that an even greater sacrifice of life stands charged against a single industry of the United States; and that, in contrast, this loss of life is due very largely to preventable causes.

Chart 1A

TOTAL NUMBER OF PASSENGERS, EMPLOYEES, AND OTHER PERSONS KILLED
IN REPORTABLE STEAM RAILROAD ACCIDENTS IN THE UNITED
STATES 1888 TO 1922 INCLUSIVE

Number Killed

Passengers	10,802	
Employees	98,871	
Other per.	190,048	
Grand total	300,821	

WASTE OF PRODUCTION

While one cannot measure human life in terms of dollars, we know that waste of life carries with it a very material waste of the nation's productive power. From insurance records and estimates of life expectancy it is possible to assign an approximate economic value to a group of lives of varying ages. From the Proceedings of the Eighth Annual Safety Congress, 1919, we find that the late Dr. F. S. Crum estimated that the 45,000 public fatalities which occurred during the year 1917 resulted in an economic loss to the nation of \$557,289,000. On the basis of this calculation (the estimated productive value of a life at the average age at death being \$10,377) the 300,821 railroad fatalities for the 36 years, 1882-1922 entailed an economic loss to the nation of \$3,121,619,517. What Dr. Crum would charge us for the 3,552,931 reportable injuries which occurred during this period can only be approximated. On the basis of his \$1,671,867,000 charge for 5,625,000 public injuries recorded as occurring in 1917 (\$300 per injury) it is safe to assume that he would charge our railroad casualty account with at least \$1,066,779,300, or a total economic waste for the 36 years of more than \$4,188,398,817.

Chart 2

"TRANSPORTATION WASTE," CLASS 1 STEAM RAILROADS
 (Not including switching and terminal companies)
 YEARS 1916 TO 1922 INCLUSIVE

"Transportation Waste"	
Year	due to—
1916	Total inj.....\$29,485,700
	Clear. wrecks..... 5,163,122
	Dam. to prop..... 3,861,769
	Total 38,510,591
1917	Total inj..... 33,699,135
	Clear. wrecks..... 7,889,955
	Dam. to prop..... 4,553,502
	Total 46,142,592
1918	Total inj..... 33,369,199
	Clear. wrecks..... 14,504,371
	Dam. of prop..... 4,794,750
	Total 52,668,320
1919	Total inj..... 37,254,954
	Clear. wrecks..... 14,049,662
	Dam. to prop..... 5,883,293
	Total 57,187,909
1920	Total inj..... 56,338,169
	Clear. wrecks..... 20,887,706
	Dam. to prop..... 10,100,089
	Total 87,325,964
1921	Total inj..... 31,953,423
	Clear. wrecks..... 9,967,746
	Dam. to prop..... 6,336,097
	Total 48,239,266
1922	Total inj..... 33,417,497
	Clear. wrecks..... 9,451,022
	Dam. to prop..... 5,356,628
	Total 48,225,147

"Transportation waste"
 Years 1916 to 1922 inclusive

Total injuries	\$255,500,077
Clearing wrecks	81,913,584
Damage to property	40,886,128
Grand total	378,299,789

Chart 1 shows the variation in the number of fatalities for "Passengers," "Employees," "Other Persons" and "Total." It is generally conceded that in the earlier stages of accident statistics the records of fatalities were more complete than the records of injuries, and for this reason Chart 1 is shown on a fatality basis. The striking feature of this chart

is the comparatively large number of fatalities to "Other Persons," a fact that justifies serious consideration. Fortunately, during the last five year period (including the year 1922) the number of fatalities recorded under this classification was reduced by 10,000. The number of fatalities to employees recorded in the last five-year period was the lowest for any period with the exception of the second.

Chart 1-A compares the total number of "Passengers," "Employees," and "Other Persons" killed in reportable steam railroad accidents in the United States during the years 1888 to 1922, inclusive. The fact is again revealed that "Other Persons" is a class of railroad accidents that demands special attention.

Chart 2, based on information on file at the Interstate Commerce Commission, shows that for the seven years from 1916 to 1922, inclusive, there has been a "Transportation Waste" due to personal injuries, clearing wrecks and property damage, of \$378,299,789.

Chart 3

RATIO OF TRANSPORTATION WASTE TO TOTAL REVENUE, CLASS I STEAM RAILROADS

(Not including switching and terminal companies)
YEARS 1911 TO 1922 INCLUSIVE

Year	Total railway operating revenue	Total Waste	Ratio of "waste" to total Revenue	
1911	\$2,692,518,403	\$63,339,439	2.35	████████████████████
1912	2,744,342,277	65,812,238	2.40	████████████████████
1913	3,043,324,782	74,606,274	2.45	████████████████████
1914	2,969,898,838	79,677,345	2.68	████████████████████
1915	2,871,563,047	67,864,316	2.36	████████████████████
1916	3,381,597,866	61,911,597	1.83	████████████████████
1916	3,596,865,766	65,607,043	1.82	████████████████████
1917	4,014,142,747	85,745,052	2.14	████████████████████
1918	4,880,202,255	113,493,816	2.33	████████████████████
1919	5,144,466,361	167,830,504	3.26	████████████████████
1920	6,178,192,428	216,057,347	3.50	████████████████████
1921	5,516,556,455	134,267,730	2.43	████████████████████
1922	5,559,092,708	91,009,479	1.63	████████████████████

Note:—Years 1911 to 1916, inc. ending June 30th..

Years 1916 to 1922, inc. ending Dec. 31st.

"Total waste" includes:—Cost of injuries to persons; clearing wrecks; damage to property; damage to live stock on right of way; loss and damage to freight and baggage.

Chart 3 shows the ratio of total transportation waste as compared with total revenue for the years 1911 to 1922, inclusive. It is gratifying to note that the year 1922 shows the lowest ratio for the period covered.

Chart 4 shows the annual personal injury expense 1916-1922, inclusive, as well as the ratio of personal injury expense to total "transportation waste" expense.

Chart 5 indicates the waste in life resulting from collisions year by year, 1906 to 1922, inclusive; 6,325 persons were killed and 98,461 injured during that period, with a total damage to railroad property of \$86,563,474. [Damage to merchandise in these collisions, also sums paid to employees and passengers for or on account of bodily injury, or death, not included.] Of the total 110,084 collisions there were recorded 17,550 rear-end and 9,512 head-on collisions. During the year 1922 there were 508 rear-end and 257 head-on collisions, a total of 756. Of these, the records show that 737, or 96 per cent, are charged to negligence of employees. It would be interesting to know how many of these employees had served on safety committees.

Chart 4

"TRANSPORTATION WASTE," CHART SHOWING RATIO OF ANNUAL PERSONAL INJURY EXPENSE TO TOTAL WASTE EXPENSE, CLASS 1 STEAM RAILROADS

(Not including switching and terminal companies)

YEARS 1916 TO 1922 INCLUSIVE

Yr.	Amount of waste	Ratio	
16 Per. inj.....	\$ 29,485,700	44.9	██
Total	65,607,043		
17 Per. inj.....	33,699,135	39.3	██
Total	85,745,052		
18 Per. inj.	33,369,199	29.4	██
Total	113,394,816		
19 Per. inj.....	37,254,954	22.2	██
Total	167,830,504		
20 Per. inj.....	56,338,169	26.1	██
Total	216,057,347		
21 Per. inj.....	31,935,423	23.8	██
Total	134,267,730		
22 Per. inj.....	33,417,497	36.7	██
Total	91,009,479		

It is most gratifying to see the remarkable reduction made in the number of total casualties; and, while the property damage account still stands charged with an average of more than \$6,600,000 for each of the last three years, the amount charged to the personal injury expense account must have shown a material reduction. It is unfortunate that the 1921 record could not have been maintained during 1922.

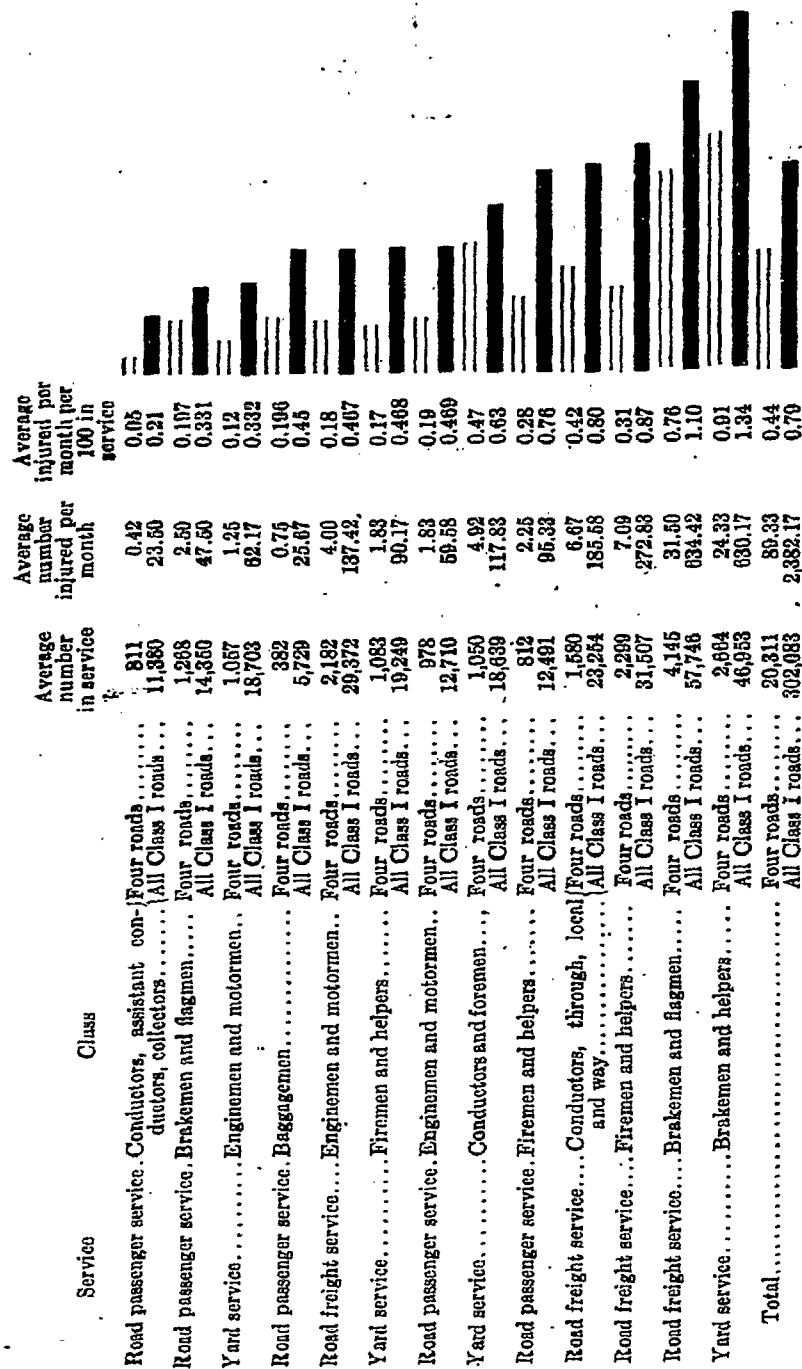
Chart 5

TOTAL CASUALTIES RESULTING FROM COLLISIONS, STEAM RAILROADS, FOR YEARS 1906 TO 1922, INCLUSIVE

Year	Total number of casualties	
1906	8,518	
1907	10,317	
1908	7,126	
1909	5,737	
1910	8,198	
1911	7,430	
1912	8,327	
1913	8,488	
1914	6,163	
1915	5,937	
1916	4,211	
1917	5,465	
1918	4,930	
1919	4,169	
1920	4,093	
1921	1,969	
1922	2,708	
Total	104,786	

Chart 6

CHART SHOWING FREQUENCY RATES OF TRAIN AND SERVICE NON-FATAL CASUALTIES TO EMPLOYEES ON DUTY, BY CLASS OF EMPLOYMENT, CLASS I STEAM RAILROADS; COMPARED WITH TWO EASTERN AND TWO WESTERN RAILROADS HAVING LOW FREQUENCY; YEAR 1922



Note: Two Eastern and two Western roads.

Class I steam railroads.

An analysis of the records for 1920, 1921 and 1922, discloses the fact that there is an even greater waste in railway property charged against derailments than is charged to collisions, as shown in the following statement:

Year	Railroad property damage due to collisions	Railroad property damage due to derailments
1920	\$9,078,110	\$22,987,790
1921	4,657,390	16,518,440
1922	6,176,780	14,969,250
Total	\$19,912,280	\$54,475,480

A comparison of the totals indicates that the amount of damage due to derailments is more than two and one-half times the damage to property due to collision; and assuming that a two-to-one ratio would hold for the period 1906 to 1922—which shows a property damage due to collisions of \$86,563,474—it is estimated that the property damage due to derailments would amount to \$173,126,948 with a combined property damage of \$259,690,422.

These money costs of railroad accidents have been analyzed and graphically shown with the one purpose of revealing causes of waste, and to furnish the railroad safety man with additional ammunition with which to help him fight the good fight.

It has long been recognized that a dollar saved is a dollar earned. Prevention of railroad accidents reduces waste of life, personal injury expense and property damage, and it is difficult to understand why progressive management will ease up on safety work as an economy measure. Is not this a penny-wise-and-pound-foolish policy? For, unfortunately, the pound sterling in this case also carries with it the pound of flesh.

Chart 7

CHART SHOWING NON-FATAL CASUALTIES TO EMPLOYEES ON DUTY PER MILLION MAN-HOURS INCLUDING ALL BRANCHES OF EMPLOYMENT
COMPARING DISTRICTS WITH LEADING RAILROAD IN EACH
DISTRICT, CLASS 1 STEAM RAILROADS, YEAR 1922

District or Railroad	Million Man-hours	Number Injured	Number Injured per Million Man-hrs.	
Western Dis.....	1,634.4	40,934	25.046	██
U. P. System.....	132.2	1,359	10.279	████████████████
Eastern Dis.....	1,861.5	54,563	29.360	██
D. L. & W.....	56.8	832	14.639	████████████████
Southern Dis.....	746.4	17,926	24.017	██
C. & O.....	58.3	879	15.076	████████████████

Illustrating the condition above cited, we quote from the September bulletin of one of our leading railroads. Relative to the increase and subsequent decline in casualties we read:

"This indicates that we are gradually recovering from the set-back received by cancellation of safety meetings and general let-up in safety work by the safety committeemen for five months during the latter part of 1922."

In support of the effectiveness of uninterrupted organized safety work decrease of approximately 20 per cent in the accident frequency rate has been recorded by one of our large railroad systems for the year 1922 as compared with the 1921 figures; and this notwithstanding the fact that the average record of all Class I railroads throughout the United States showed an increase of approximately 15 per cent during that period.

For this present year, 1923, this road has shown a further reduction; a frequency rate of 7.91 for the first six months; this compared with the 1921 record of 12.70 indicates a reduction of 37.7 per cent.

NON-FATAL ACCIDENT FREQUENCY RATE

Chart 6 is a comparison of the non-fatal accident frequency rates of train and train-service accidents by occupations, between the average for all Class I railroads and two eastern and two western roads having low frequency rates. In every instance the "bogey" record is well under the average rate, and, in some cases, 50 per cent to 75 per cent. Certainly, these figures furnish positive evidence that *"It Can Be Done."* In fact, the only justifiable reason for the compilation of such accident statistics is for the purpose of stimulating the competitive spirit that already exists and is unquestionably very largely responsible for the marked reduction made in railroad accidents during the past 10 years through preventive methods adopted.

In an endeavor to further stimulate the contest spirit we submit Chart 7 showing non-fatal casualties to employees on duty per million man-hours in all branches of employment, being a comparison of the average frequency rates of the different districts with the frequency rates of the roads having the best records in the respective districts for the year 1922.

Had all Class I railroads of these three districts attained the frequency rate of the record road within their respective districts it is estimated that there would have been a 58 per cent reduction in the Western District; 50 per cent in the Eastern District, and 37 per cent in the Southern District. These reductions would have resulted in a saving of more than 58,000 injuries in the three districts for the year 1922, and, on the basis already used (\$300 per injury) would have effected a saving of \$17,400,000. (For the first eight months of 1923 the Union Pacific System shows an accident frequency of 7.738, which is a 24.7 per cent reduction as compared with the 10.279 average frequency of the system for 1922 as shown on Chart 7.)

Chart 8

INJURIES TO EMPLOYEES ON DUTY PER MILLION MAN-HOURS, IN TRAIN,
TRAIN-SERVICE AND NON-TRAIN ACCIDENTS, CLASS I STEAM RAIL-
ROADS, HAVING 50,000,000 OR MORE MAN-HOURS, YEAR 1922

Rank	Name of Road	Injuries	Man-hours Thousands	Injuries per Million Man-hours	
1	U. P. R. R.....	432	70,505	6.13	████████
2	U. P. Sys.....	1,359	132,210	10.28	██████████
3	S. P. Co.....	1,956	142,427	13.73	██████████████
4	D., L. & W.....	832	56,835	14.64	██████████████
5	Ches. & O.....	879	58,306	15.08	██████████████
6	Erie	1,098	52,998	20.72	██████████████████
7	Lehigh V.....	1,128	52,538	21.47	██████████████████
8	S. L.-S. F.....	1,399	62,914	22.24	██████████████████
9	Southern Ry.....	2,940	131,509	22.36	██████████████████
10	C., M. & S. P.....	2,827	124,960	22.62	██████████████████
11	Atlantic C. L.....	1,286	56,388	22.81	██████████████████
12	Boston & M.....	1,620	69,209	23.41	██████████████████
13	S. P. L. in T. & L.	1,315	55,158	23.84	██████████████████
14	Northern P.....	1,808	74,752	24.19	██████████████████
15	Norf. & West.....	1,542	63,625	24.24	██████████████████
16	Illinois Cent.....	3,546	143,497	24.71	██████████████████
17	N. Y., N. H. & H..	2,292	89,026	25.74	██████████████████
18	C., Bur. & Qu.....	3,289	120,219	27.36	██████████████████
19	At., T. & S. F.....	4,684	170,606	27.45	██████████████████
20	N. Y. Central.....	5,866	213,233	27.51	██████████████████
21	Phila. & Read.....	1,785	64,556	27.65	██████████████████
22	Louis. & Nash.....	3,267	117,449	27.82	██████████████████
23	Gt. Northern.....	2,119	75,012	28.25	██████████████████
24	Chic. & N. W.....	3,448	117,596	29.32	██████████████████
25	C., C., Ch. & St. L.	1,540	50,635	30.41	██████████████████
26	Ch. R. I. & Pac..	2,955	91,210	32.40	██████████████████
27	Balt. & Ohio.....	5,361	154,292	34.75	██████████████████
28	Penn. System.....	19,367	528,169	36.67	██████████████████
29	Missouri Pac.....	3,190	84,169	37.90	██████████████████

Chart 9

CHART SHOWING NON-TRAIN CASUALTIES (NON-FATAL) TO EMPLOYEES ON DUTY, CLASS I STEAM RAILROADS
(Roads having an excess of 50 million man-hours, including all branches of employment) Year 1922

Railroad	Non-train million man-hours	Injured Number	Injured per million man- hours	
U. P. R. R. Co.....	56.6	315	5.57	████████
O. W. R. R. & N.....	18.9	161	8.53	██████████
L. A. & S. L.....	12.0	132	10.96	████████████
So. Pacific.....	122.3	1,437	11.75	██████████████
D. L. & W.....	46.6	655	14.07	██████████████
C. & O.....	45.8	648	14.16	██████████████
O. S. L.....	20.3	342	16.87	██████████████
Lehigh	42.6	775	18.21	██████████████
At. Coast L.....	47.5	880	18.51	██████████████
St. L. & S. F.....	52.6	1,016	19.33	██████████████
C. M. & S. P.....	102.2	2,066	20.22	██████████████
S. P. (T. & La).....	47.8	1,005	21.04	██████████████
So. Railway.....	84.7	1,793	21.18	██████████████
C. B. & Q.....	98.6	2,124	21.55	██████████████
Boston & M.....	58.1	1,293	22.24	██████████████
N. Y., N. H. & H.....	74.1	1,655	22.33	██████████████
Norfolk & West.....	52.8	1,185	22.44	██████████████
L. & N.....	97.0	2,199	22.67	██████████████
No. Pacific.....	62.6	1,422	22.73	██████████████
Phila. & R.....	61.6	1,202	23.32	██████████████
Gr. Northern.....	62.3	1,463	23.49	██████████████
N. Y. Central.....	199.6	4,729	23.69	██████████████
Ill. Central.....	103.0	2,511	24.38	██████████████
C. & N. W.....	95.9	2,451	25.55	██████████████
Erie	34.0	960	28.27	██████████████
C. R. I. & P.....	74.6	2,298	30.79	██████████████
B. & O.....	124.9	3,993	31.98	██████████████
A. T. & S. F.....	124.5	3,986	32.02	██████████████
Missouri Pac.....	70.4	2,409	34.23	██████████████
Pennsylvania	419.5	14,877	35.46	██████████████
Total	2,502.9	61,982	24.76	██████████████

Chart 8 has been developed from Interstate Commerce Commission data covering train, train-service and non-train accident to employees on duty, and is merely a rearrangement according to accident frequency of the alphabetical records contained in I. C. C. Bulletin 87. This group (with one of smaller roads, not shown) might properly be termed the "Major" and "Minor" Leagues, and while it is not practicable for more than one road to head the batting list, it certainly is possible for all roads to improve their batting average. The Union Pacific Railroad, which, according to the Interstate Commerce Commission records, holds first place, has only attained this position through the persistent effort of a well-organized safety department having the active support of the executive officials who have truly given safety right-of-way in the operation of their railroad. The reduction of approximately 80 per cent that has been made in this road's accident frequency has not just happened. It has required an organization which has warranted and demanded the cooperation of the employees themselves, on which naturally rests the success of any safety program. Another element in the work done by this road is the fact that the field of analysis of accident causes has been extended from the standard I. C. C. reportable accidents—three or more days' lost time—to the *one-day lost time cases* (where the injured person loses more than the remainder of the day) and utilized the information thus obtained in developing preventive methods.

As a further illustration of the money to be saved through organized safety work, on the basis of a 6.127 frequency rate as recorded for the Union Pacific (Table 100, Page 79, I. C. C. Bulletin 87) figured against the average frequency rate shown for all districts (Table 100, Page 76, I. C. C. Bulletin 87) it can be estimated that, had all roads attained this 6.127 frequency rate for 1922, there would have been effected a 77 per cent reduction in the number of casualties and a corresponding reduction in the personal injury expense, amounting to a saving of 88,585 casualties and \$25,734,813 (personal injury expense 1922, \$33,417,497—see Chart 4), a saving that unquestionably can be effected through increased application of up-to-date organized safety methods.

These competitive charts have been developed on the basis of injuries not only because this classification is considered a more conclusive measurement of relative risk factors, but for the further reason that the fatality percentages only include such deaths as occur within 24 hours of the time of injury, and the Interstate Commerce Commission records show that approximately 10 per cent of the total number of persons killed are recorded under the heading of "subsequent fatalities"—a discrepancy that materially discounts the value of our railroad fatality statistics.

Chart 9 covers non-train injuries to employees on duty, and was developed from information received from the Interstate Commerce Commission.

Notwithstanding the vast amount of money spent by the railroads for the installation of automatic block signals—one of the most effective life-saving devices ever invented—the "personal equation" still stands charged with a heavy loss of life and millions of dollars wasted through property

damage. Indifferent flagging, kicking knuckles, and violations of the blue rules, are also phases of the "human factor" problem as yet unsolved. Educational methods have accomplished a great deal, and are the hope of the immediate future.

The disorganization resulting in the railroad industry, as well as other industries, during and subsequent to the war is being gradually overcome. This situation has been aptly described as—"The iron horse, well curried but poorly fed; over-regulated; nearly strangled; almost dead." The railway safety men in particular, and the public in general, view with sincere appreciation the rehabilitation of our railroad systems through the expenditure in 1923 of \$1,540,000,000 to insure safe and dependable service—a much-needed and very acceptable contribution to the cause of national safety.

Those of us who have paused in front of the New York Public Library have been impressed with the inscription that is carved on the Fifth avenue façade above the figure of Truth—"But Above All Things Truth Beareth Away the Victory." It is in a spirit of truth and fairness that the facts embodied in this paper have been submitted, with the purpose of indicating the more dangerous sectors of our battle front, as well as to furnish some striking examples of what has been accomplished by an organized and persistent offensive against preventable railway accidents.

While much good work has already been done, the fact remains that an even greater task confronts us, and, in the words of the indomitable Theodore Roosevelt—"Success can only come to the player who hits the line hard."

Can there be a more fitting slogan for the men in the ranks of Railroad Safety than the message of immortal fame—"Let Us Cherish Within Our Hearts the Memory of Our Fallen Comrades. Salute Them! Then Forward!"—McAlexander.

SAFETY AS A BUILDER OF MORALE

F. W. MITCHELL, DIRECTOR OF PERSONNEL, NEW YORK, NEW HAVEN AND
HARTFORD RAILROAD, NEW HAVEN, CONN.

We sometimes stand in amazement before the picture of the progress of our railroads, during the past two decades, in developing their material resources as represented by the mechanical appliances for controlling train operation, and for increasing the capacity for the movement of units of high tonnage.

It is a condition that has been reached only by the conscription of time, money and skill. It has required repeated effort in experiment before the present results were attained. And yet, when these resources,—involving as they do the expenditure of large capital investment,—are finally put into operation they are dependent in a very large degree for the results obtained upon the treatment they receive at the hands of the human factor in the equation.

At this point no even balance is struck, nor is it possible to secure one. No mechanism that functions in the production of transportation is as complex in its makeup as are the human beings to whom are committed for maintenance and operation these mechanical reservoirs of power and motion. And although the human element too is susceptible to great changes, by means of education and training, it can hardly be argued that the same effort has been given to railroad "humanics" that has gone into the development of the mechanical resources.

Indeed, it would be difficult to describe just how we should proceed, in order to attempt in this field, the accomplishment that is apparent in the mechanical. Some things, however, are evident, and among these we find that there should be greater care used in selecting our human material, investigating the references presented and the conditions which surrounded the new employee before taking him into the organization.

It is a fact that a department which interests itself with the problem of finding suitable men for employment and suitable jobs for the men employed, together with measures for developing a better morale and a more evident spirit of co-operation, is engaging the attention of many men today who are responsible for the safe and efficient operation of our great railway systems.

For a number of years the railroads have been carrying on the safety work which is now generally understood. The benefits derived from this effort have been far in excess of the cost of the work.

It is not too much to say that the entrance into the larger field, and the expanding activities which are directed toward the development of morale have resulted in a measure from the evident effects of the safety work in this direction.

There was unquestionably a time in the history of our American Railroad life when the voice of the public was calling loudly for speed in annihilating distance together with reliability in maintaining schedules. The effect of this strong sentiment was to increase, in no small degree, not only the number of "chance takers" in train operation, but also the extent of the risks they were willing to take.

Operating officers noted their violations of rules and instructions when conspicuous consequences compelled recognition. Investigations of accidents revealed such information only as it was impossible to conceal. A spirit of competition and rivalry tended to further aggravate the dangerous situation. Cautionary measures were set aside by the employee if so he might thereby execute some stunt which, if successful, might mark his exceptional ability. There was a wide separation in the theory and practice of safe operation. Confidence was weakened. Morale reduced. That which should have been an army of organized workers for safety was slowly becoming a mob of "go as you please as long as you're lucky" buccaneers.

Even the grounds for promotion were becoming more and more based upon the element of "luck," and the "good guesser" could ride the top wave of popularity. Safety was becoming an artificial veneer.

But there was a penalty to all this and from time to time it presented stern demands. It became evident that something was going wrong and that a change was required not only in methods but in the appraisal of values. Safety First was made the slogan for the railroad workers. Committees were appointed. Meetings were held. Conditions were revealed which needed correction. The mirror was held up before dangerous practices that showed them in their true aspect. Officers and men were brought into close personal contact which had as its foundation the pursuit of safety. Together they searched for the remedies for situations which their new relationship was compelling them to face, and together they began to realize that their interest was common in endeavoring to find an answer that would satisfy the conscience of each that the requirements of safety were being met.

When the enlightened conscience is satisfied with the contacts with life as it is expressed in action as well as in word, that elusive and almost indefinable element which we call morale, appears; because an atmosphere which is conducive to its growth and development has been found. There is something in every real man that calls him to put his best effort into his work. He may vary somewhat in his response to this call, but the knowledge that he is working together with other individuals in the army of employees to carry out a program for protection, is a compelling force; because it is founded in sincere endeavor, and carried out in the spirit of service. Its outgrowth is quickened morale. Fathers and mothers may no longer remonstrate with sons who desire to enter the train and locomotive service because it is among the most hazardous that they can choose. It is no longer a badge of honor to carry the mutilations that formerly marked the Railroad employee almost without exception, if he had been fortunate enough to escape with his life from the dangers to which he was subjected. The whole trend of the safety work is toward the promotion of those forces, sentiments and actions which inspire respect, loyalty, and efficient service. The work furnishes a point of contact between employer and employee that is mutually advantageous. From the experience there comes the knowledge that other points of contact are available, and the means of securing them follow closely.

Evidence is at hand that faster development is possible that there are other conditions that may add their influence and power; but it has been to Safety Work that credit is due for indicating how confidence can be renewed. These efforts should not be allowed to pass with their worth unnoticed and their power as a builder of morale unappreciated.

REPORT OF NOMINATING COMMITTEE

Mr. Scott: For chairman we have great pleasure in nominating Mr. Fred Metcalf of the Northern Pacific Railroad, for vice-chairman, Mr. Charles E. Hill of the New York Central Lines, and for secretary, Mr. Emerson R. Cott of the Hocking Valley Railroad.

(Motion made, seconded and carried approving report.)

THE PULLMAN COMPANY'S CONTRIBUTION TO RAILROAD SAFETY

E. F. CARRY, PRESIDENT, PULLMAN COMPANY, CHICAGO, ILL.

Railroad travel is made safe by the prevention of accident and of illness. Anything that does either of these things is a contribution to the safety of travel. The prevention of accidents belongs chiefly to the field of engineering, of illness to the field of hygiene and sanitation; any inquiry into the question before us must therefore extend to both these fields.

The crux, however, of mechanical and hygienic preventative methods is the training of the human factor, the instilling of habits of caution and vigilance into our employees who are directly concerned with the handling of the 34,000,000 passengers we carry a year. Safety committees are vital factors in our manufacturing and repairing shops. In each district there is a conductors' and porters' safety committee, also a joint safety committee in each of the 300 cleaning yards we maintain. These committees meet monthly to discuss ways and means of preventing accidents, and all these employees are urged to make recommendations for improving the safety of Pullman travel. Results have been gratifying and many prizes are awarded each month for suggestions that prove practical.

The Pioneer, the first Pullman car constructed from the ground up (in 1865) by Mr. Pullman, was fittingly named. It marked with its monitor roof and general sturdiness a tremendous advance in the art of car building, and was truly a pioneer in so far as strength, safety and solidity in passenger car construction was concerned.

The record of Pullman achievement in improvement and development of railroad equipment is one of constant progression. Probably the Pullman vestibule would be accorded premier position by railroad men the world over as the device which has done more than any other to render railway travel safe. Communication between cars in a train at high speed would be perilous were it not for this vestibule. It not only renders passage from car to car secure and protects passengers from exposure, but it provides to a marked extent a bulwark against serious damage to the body of the car and its occupants from the lighter shocks and wrecks. The enclosed vestibule of today is a development of the narrow vestibule brought out in 1887, and since its introduction in 1893 has become the universal standard for all important trains.

THE SIX-WHEEL TRUCK A CONTRIBUTION TO SAFE TRAVEL

Another important Pullman development for the heavier passenger train cars is the six-wheel truck with its long wheel base, its excellent general arrangement and fine riding qualities contributes greatly to comfortable travel. The excellency of this truck design has led to its general adoption for heavy passenger equipment cars. The original six-wheel truck arrangement is in common use today with only such variations as are necessitated by changes in the materials employed. Its contribution to

safety, particularly in high speed service in our heaviest train, lies in the fact that with six wheels a broken or burnt off journal in service will not necessarily cause a wreck, while with a four wheel truck disaster practically would be unavoidable.

MECHANICAL DEVELOPMENTS IN PULLMAN CAR SAFETY

Early recognizing the importance of providing a bulwark against collisions (in addition to the enclosed vestibules), special protective features, generally designated as anti-telescoping devices, were first introduced in Pullman cars. These devices consisted of steel introduced at sills, in ends, and at the top of the vestibule. To the extent to which such devices are capable of absorbing energy by resistance to distortion and rupture, they afford collision protection to the car, and the use of extra metal for this purpose has become general in the construction of passenger equipment.

Wrecks, of course, will happen. Yet deplorable as they are, they serve one good purpose: they are an object lesson from which the Pullman Company often may learn lessons and from which the public does profit through the experience thus gained.

Among other noteworthy improvements developed or adopted for use on Pullman equipment in recent years there may be listed:

Locking bolts for connecting trucks to bodies as an anti-telescoping feature. The truck secured to the body by an extremely heavy locking bolt affords in case of collision great resistance against one car body invading another.

New truck design which permits of greater ease of inspection and with its pivoted and boxed in equalizer arrangement is a safeguard against the possibility of wreck due to a broken equalizer.

Development and adoption of a practical application of the new A. R. A. standard "Type D" heavy freight coupler for passenger cars and correspondingly strong draft gear attachment to prevent the breaking in two long trains and the breakage of coupler knuckles occasionally experienced with ordinary couplers.

Improved generator suspension to insure against the possibility of wrecks due to the loosening and dropping of generators.

Boarding the train we find the improved step box, with a larger surface area and without the hand-hole on the top of the box in which small French heels are sometimes caught.

The anti-pinch device on car doors to prevent fingers getting caught between the door and door jamb.

Guard rails on hallway windows to prevent you coming into contact with windows while train is in motion.

The floor lights in the aisle to guide your footsteps at night when the major lighting system has been turned off.

Berth locking device to prevent upper berth folding up unexpectedly. Safety step ladder to be used in ascending to and descending from upper berth.

Curtain guards for upper berths to prevent occupant rolling out.

Inside vestibule grab handle to steady your passage from car to car.

Vestibule roller curtains, to prevent people catching their fingers between diaphragm and face plates.

Improved hinged buffer plate, to prevent feet being caught between end sill and buffer. This plate also presents a smooth surface and eliminates tripping hazards.

Vestibule ceiling lamp over trap door. This not only provides illumination during transit from car to car, but also guides your footsteps when entering and leaving car.

Pullman equipment is constantly scrutinized and all suggestions affecting the safety or comfort of passengers receive careful consideration. Inventive geniuses in car equipment all over the country regard Pullman approval as a mark of merit and gladly afford the Pullman Company a chance to investigate and try out new devices. Our own chemical and physical laboratories are constantly engaged on the work of research, investigation, examination, and check on materials, and an inspection force is everlastingly on the job. They examine materials, they keep an eye on equipment and watch service.

HYGIENE IN TRAVEL

I will now discuss briefly the Pullman Company's contribution to the safety of railroad travel in the field of hygiene:

Perhaps the greatest single contribution to the hygiene of railway travel was the development of a practical sleeping car and the extension of its use throughout the country. That invention and that service are contributions of the Pullman Company and the foundation of its growth. Few or none of us here will remember the days before there were sleeping cars, but many of us have lived through times when they were less plentiful than now and know the discomforts of a night in a coach without a bed. Any one who can recall the enervating fatigue of such a journey will not doubt that the health of the traveler is protected by having the sleeping car available to his use. Sleeping cars not only have been aids to comfort and health, but they have been active agents in the development of our country. Without them California, Florida, the great Northwest and other remote and desirable sections of these United States could not have advanced as they have in population and wealth. Without the sleeping car the missionary of business—the traveling man—would be only 50 per cent efficient and the cost of living necessarily much higher.

Not quite so definitely an addition to the hygiene of travel, but still distinctly of that order, are the improved facilities for comfort and convenience in making the toilet which came with the sleeping car and have kept pace with its development and improvement.

Of almost equal importance, however, with the original contribution was the arrangement whereby it became possible to have meals served on board trains, first as part of the sleeping car service itself and later as the separate dining car, rather than for the traveler to have to subsist on what he could carry or take uncertain chances on what he might pick up

by the way. No one will deny that good food, properly served and at regular intervals, contributes materially to health. No wonder the newspapers of 1865 and 1866 were enthusiastic in their praise, as witness the following:

"Pullman is a benefactor to his kind. The dreaded journey to New York becomes a mere holiday excursion in his delightful coaches.

"But the crowning glory of Mr. Pullman's invention is evinced in his success in supplying the car with a cuisine department where every variety of meats, vegetables and pastry may be cooked on the car according to the best style of the culinary art."

It is interesting to note in passing that the closed vestibule, already referred to as such great importance in connection with the prevention of gross mechanical accidents, is almost the direct outgrowth of the introduction of the separate dining car. It was early realized that it would be necessary to protect against accident and exposure passengers who must pass from other cars into them.

The Pullman Company has always held to a high standard of cleanliness in its cars. Ordinary cleanliness is ordinary sanitation, and soap, water, and elbow grease are its consistent elements; but methods and processes of car cleaning have from time to time been inaugurated which were real contributions to railway sanitation.

The company was an early and extensive user of compressed air for this purpose. An air blast at 90 pounds pressure to the square inch will succeed in dislodging much dust from carpets, upholstery and bedding which beating leaves in place. It has the disadvantage, however, of distributing it everywhere about, and when vacuum cleaning was first introduced we tried to substitute that. Our early experiments failed; but finally, in 1914, after long and painstaking work, with the cooperation of manufacturers of vacuum devices, a practical system for railway work was developed and is now a standard process. Within the last two years apparatus has been developed by our engineers for creating a vacuum by means of compressed air, and for applying both compressed air and vacuum cleaning in one and the same apparatus.

The brilliant Pintsch light, which for a number of years had had a wide use in Europe, was first introduced into America by the Pullman Company in 1883. Eyes must have suffered from the dim, yellow and flickering light of oil lamps used up to that time.

The part played by the Pullman Company in the development of electric lighting of cars is important. Without its initiative and its vast resources for practical and costly experiment it is fair to believe that electricity would not have been successfully utilized for this purpose for many years. It was barely two years after the invention of the incandescent lamp by Edison in 1879, that it was first applied on an English railway in an American Pullman car supplied with electricity by French accumulator cells. From that crude beginning there has been a steady progress to the present adequate system of dome lights, berth lights, aisle lights, and vestibule lights, all lending their aid to the conservation of vision and the prevention of accidents.

VENTILATION STUDIES FOR PASSENGER HEALTH

Among the important contributions of the Pullman Company to the hygiene of railway travel are its studies in car ventilation, which began in 1905. Previous to that time almost nothing was known on the subject, and only meager and inadequate attempts had been made to learn. Ventilation was believed to be bad, and in general it probably was bad, but no one knew quite why it was bad or in what way it could be corrected. These studies ran through many years; indeed, in a less extensive way, they are still being conducted. They included a detailed investigation of the condition of the air of cars, measurements of its currents of flow, its distribution, etc., as well as experiments with many kinds of ventilating devices, good, bad, and indifferent. During the course of those studies some five thousand air analyses have been made, and many hundreds of measurements of air currents. Out of them has come a volume and variety of knowledge which is adequate to maintain effective ventilation under practically all conditions of railway service and which has been utilized not only for making standard plans of our own, but plans which are rapidly becoming standardized throughout all railway service.

When our study of this subject was begun the science of ventilation was just emerging from the dark ages of misconception and error, and rays from the light of exact knowledge were just beginning to touch it. The sun is fully up now, and it enables us to see how important are heat and heating facilities in connection with air supplies. Indeed, it has shown us that the proper control of heat is a more important hygienic problem, and a rather more difficult one, than the maintenance of a proper supply of air. This has led us to multiply our heat units and controls for a car from one to seven. That also makes for health.

The blow fan is an important adjunct to the maintenance of good air conditions which was first introduced into railway service by the Pullman Company. And the small louvre mounted in the window sash, which may be opened and closed by the passenger according to his desire, is a recent innovation which is worthy of a place in this list.

PURE WATER FACILITIES ON PULLMAN CARS

Of almost equal importance with air is the water supply of a car. It *must* be supplied for drinking, and its availability for the purposes of toilet and cleaning adds to comfort and healthful conditions. The elaborate and efficient water distributing system now maintained on Pullman cars is the result of gradual development by Pullman engineers. But the mechanics of distribution is only remotely a hygienic feature; the chief thing in connection with water is its protection against contamination with disease-producing bacteria. In the main, this must be done at the source; a safe water supply must be provided, and that is entirely a railroad matter. In recent years, the United States Public Health Service, in cooperation with state and city boards of health, has taken over the task of seeing to it that the waters supplied by common carriers are of

proper standard of purity; they must all be examined and certified at regular intervals. And it is fair to say that they are practically all and always safe now as delivered to the car.

But there are sources of possible contamination after the water is safely aboard—the cooler; ice that goes into it; and worst of all, its final container, the cup. In 1912 we began dividing water coolers into two compartments so that ice and water would be kept separate. But this left the cooler open for the possible entry of foreign materials, so in 1920 we developed a method of doing away with the open cooler entirely, substituting for it a cooling chamber which is part of the pressure system about which the ice is packed—undoubtedly the best and safest plan that has ever been put into use.

The common drinking cup was universally abolished and the individual paper cup substituted about ten years ago.

Lest we be too generous with ourselves in the appropriation of laurels, let it be admitted at once that dividing the water cooler and abolishing the common cup were not original conceptions. They were first demanded by the state health officer of Kansas. But once the demand was made, the idea was accepted by the Pullman Company and costly improvements were made universal that were only locally necessary. And the common towel was unknown in Pullman cars long before it became the object of the official taboo in any of the states.

There are many minor sanitary features of Pullman equipment and service that would be worthy of being classed as contributions to the safety of travel in a more extended discourse—plumbing and toilet arrangements, the care and handling of linen, fumigation and disinfection, the encasing of beds and bedding, first aid packets on cars, and others—but they may be only mentioned here. Particular claims may be made, however, for the dental lavatory, adopted in 1909, and the open-front toilet seat, adopted five years ago.

PHYSICAL EXAMINATIONS OF EMPLOYEES

It is essential to the safety of travel that healthy men compose the train crews, particularly that they be free from communicable infectious diseases. It has always been our policy to hold men who are so affected out of service. Only healthy men are employed; and we are now engaged in a complete physical survey of porters, which will be repeated from time to time, in an attempt to contribute greater safeguards to those whom they must serve.

THE STANDARD RAILWAY SANITARY CODE

In 1905 the Pullman Company established, and has since maintained, the first department of sanitation conducted by any common carrier in this country. Through this department it has kept in close touch with sanitary progress in general and with railway sanitation in particular. One of the things we have had to contend with is a great diversity of sanitary laws and regulations in the states, which have sometimes been contradictory, often inharmonious, and occasionally entirely impractical or absurd

Partly through the efforts of our department of sanitation there has been developed in the last few years a Standard Railway Sanitary Code, covering all the important features of safeguarding the health of railway travelers, as a proposed substitute for the diverse state and national laws and regulations which went before it. This has now been adopted by thirty-one of the states, and the interstate regulations have been so revised as to be entirely harmonious with it, so that uniformity of public requirements is fast replacing the former chaos. In so far as we have contributed to the formation and the introduction of this code—and that is materially—we have contributed not only to the safeguards of health in railway travel, but to the peace of the railways as well.

Chairman Bentley: I have been urged to make the appointment of the film committee this morning so that there may be no question but what every member of the film committee will have received the benefit of the discussion on the subject yesterday afternoon and be in close touch with the situation so it may be handled vigorously and at an early date.

I appoint as chairman of that committee, Mr. H. A. Adams, and as his associates, Mr. Hill of the New York Central, Mr. Rohweder of the L. & N., Mr. Lew Palmer of the National Safety Council, and, if you will pardon just a little personal expression, my interest is so keen in this subject of producing a railroad film that will be of the highest grade of service, and I have been assured by the members that I have appointed that my assistance will be valuable to them, that I am going to appoint myself as a member of that committee.

The next item on the program is a round table discussion by Mr. Braden, who, I understand, is really the originator of "Shall the Steam Railroad Section produce a bulletin for school use with blank space for printing or stamping name of individual railroads?" Will you handle this discussion, Mr. Braden?

ROUND TABLE DISCUSSION

Mr. Braden: We have handed out a little circular which we entitled "An appeal to young America." In it we placed the picture of the first steam locomotive in the United States. The children seemed to like that picture. Then we gave them the picture of two locomotives, old-timers, and lastly a picture of a scene at Harper's Ferry, which is on the Baltimore & Ohio. Then we have a little appeal to the children on different phases of safety, not only railroad safety but public safety. We put that in because we were requested to do so by some men in Baltimore who were interested in safety. We find the children just grab at that. We have never yet found one of those copies on the streets outside of the school-house, which shows that the children take them home.

We have issued this pamphlet, but we feel that with your help it could be made a much better pamphlet and at the same time could be distributed to every school in the United States. As Dr. Payne remarked, there are several million children in the school-houses these days besides 1,000,000 teachers in all schools. That is what we ask you to consider,

if you think it advisable to issue such a pamphlet with a place on the front for a railroad to stamp or print the name of its own railroad as distributor.

Mr. Scott: The matter of reaching the school children is certainly an interesting question, and I think we should give a great deal of attention to it. I have approached a number of school superintendents and school teachers, and I find that they are very eager to get something to put before the children. They haven't given this question of safety the same thought that we have, they don't look at it as we do, they are in ignorance as to the methods to be pursued in a matter of child education in safety.

Mr. Martin: Just to make it interesting to the children, I want to suggest in that pamphlet if you could work out some kind of a puzzle—children all like puzzles—you might have one where they would have to make up a highway crossing or you might split a child up into pieces and ask them to find the missing leg.

MAKING THE SAFETY COMMITTEEMEN GREATER FACTORS FOR SAFETY

(Mr. Scott took the chair at the request of Chairman Bentley.)

Chairman Scott: We have a real live organization with about four or five hundred committeemen and every one of those men is doing something every day in the interest of accident prevention work. We place in the hands of those men certain data pertaining to accidents that are most direct, and we advise them as to the best way to prevent accidents. We send them bulletins that we think are particularly appropriate for their particular line of work. We request these committeemen to make use of those bulletins in addition to the regular bulletin service. I refer to the regular bulletin service as the bulletins that go on the boards themselves.

Mr. W. L. Richards: I believe that the success of the Safety Movement on the Union Pacific has been the close sympathy that has been established between the management and the men engaged in that work. We are made to feel in every part that we are in a responsible position. For instance, a few months ago the general superintendent, riding over the railroad, noticed a brakeman riding the pilot of an engine, which, of course, is against our rules. He immediately dropped me a note and asked me if I had noticed that condition on the railroad and asked me what I had done to prevent it. That placed just a little responsibility on my shoulders which made me feel that I was really a part of the railroad.

If you want to keep committeemen interested, you have got to pay them attention; you have got to make them feel that they have a certain responsibility, and in order to keep their interest alive, you must pay strict attention to every suggestion they make, listen to them with respect; if they make a suggestion that happens to be turned down, you must use all courtesy in explaining to them every reason.

Mr. Hill: We have 46 operating divisions and each of them has a well-established committee. Most of them consist of officials from the various departments as well as men from the rank. These committees at the present time are functioning every 60 days, with the exception of two of our lines which meet every 30 days. It has been my pleasure to attend all of these 46 division committees excepting two. It has also been my pleasure to observe the intense interest manifested by each member of those committees. I have been particularly interested in observing the sincerity of the men from the ranks. I have seen switchmen, carmen, enginemen and others come into those meetings with items and take an interest, which led me to believe that they were seriously interested in the preservation of the lives and limbs of their fellow-men.

ADJOURNMENT.

Taxicab and Delivery Section

October 3 and 4, 1923

J. W. WEIBLEY, Chairman.

Treasurer, Pittsburgh Taximeter Company, Pittsburgh, Pa.

F. P. WALKER, Vice-Chairman

Secretary, General Necessities Corporation, Detroit, Mich.

CLINTON FISKE, Secretary.

Commissioner of Streets and Sewers, St. Louis, Mo.

WEDNESDAY MORNING SESSION

CHAIRMAN WEIBLEY: A year ago the Safety Congress in Detroit held a nucleus of the Taxicab and Delivery Section. The National Safety Council felt that the Congress should have in it a section for this very important and growing industry. We had a few scattered members throughout the United States but were not organized into any section.

We organized and I agreed to act as chairman for this first year until we could find out whether the taxicab industry was sufficiently interested to join together and form a real section in the Congress.

Some committees were appointed; Mr. John Greif of South Bend, Indiana, has done a wonderful work in enlisting a great number of taxicab companies as members of the National Council.

Mr. Goldsborough (General Secretary of the Merchants' and Manufacturers' Association of Baltimore, Vice-Chairman of the Baltimore Safety Council): I am very glad to notice the alliance that has been formed here this morning. I know that there is a very definite touching point between the taxicab operations and the delivery operations. There are deliveries that move slowly. We have quite a large per cent of deliveries down our way that move with lightning swiftness and it requires the agility of a gymnast to keep out of the way when you see them coming.

SAFE DRIVERS SCHOOLS AND COMMUNITY SAFETY WORK

WILLIAM W. CLOUD, PRESIDENT, YELLOW CAB COMPANY, BALTIMORE, Md.;
TREASURER, NATIONAL ASSOCIATION OF TAXICAB OWNERS

We are all keenly aware of the increased activity of our daily lives demanded by the rapid growth of business and resulting changes in conditions during the past few years. The advent of the motor vehicle and

the remarkable growth of motor transportation during the past few years has done more than anything else to speed up the daily routine and we sometimes wonder how we ever got along without this means of transportation. There are many other factors which facilitate our daily work and enable us to accomplish a given task with greater speed and less effort than formerly.

Along with the increased scope and activity of our daily lives, there has been a rapid advance in the individualistic attitude of man. The effect of the World War in developing self reliance and pride in handling one's own affairs has hindered the growth of a community spirit by which the individual's actions are controlled by what is best for the greatest number of people. The natural result of these factors has been an ever increasing accidental death record which amounted to 82,000 lives in 1922.

The tremendous increase in accidental fatalities on the streets and in the homes calls for strenuous efforts to combat this menace. The success achieved through accident prevention measures in industry has encouraged experts in this line to give serious consideration to public safety measures.

The logical basis for most concerted movements which affect human endeavors is education and the public safety problem is being attacked in this manner. By the introduction of safety instruction in the schools, children are being taught that they can no longer play in the same carefree manner that you and I did when we were considerably younger and that greater care is now needed for the preservation of human life. This particular activity should do more than anything else to develop a permanent attitude of safety in the mind of the individual.

Public safety bulletin boards displaying messages of warning and appeals for carefulness are being used in many cities and the exigencies of the accident situation demand that striking methods be used.

The sincere interest and cooperation of the parents are urgently needed in this movement and the development of a Women's Division of the Public Safety Section of the National Safety Council to carry the safety message to the home is another development in this big program. When we consider that in the city of Baltimore two-thirds of the child fatalities this year resulted from automobile accidents and burns, the necessity of safety instruction in the home is at once apparent.

Undoubtedly, we are interested most of all in automobile accidents, not only because the increasing number of deaths from this cause makes it a real humanitarian issue, but also because we are interested from the standpoint of dollars and cents in connection with the operation of our own business.

The education of the motor driver is one of the most important phases of the public safety program. The establishing of Safe Drivers' Schools in the leading cities is a development which has brought excellent results in decreasing accidents and in this particular activity of the Baltimore Safety Council, I have been intimately concerned.

The first sessions of the schools were held during May and June, 1923, and the response received have greatly encouraged the Council in its efforts. It has already been shown that the Safe Drivers' School, with the assistance of other activities can reduce automobile accidents. As a matter of fact, a 42 per cent reduction in automobile fatalities in Baltimore has been accomplished through the safety program.

Two schools were established, one for white and one for colored drivers, six lessons being given in each school. The lessons consisted of lectures on the mechanism of the car and inspirational safety addresses, combined with sufficient entertainment to make the classes attractive. The interest and attention of the students attending these classes was remarkable. The weather was uncomfortably warm and the classes lasted two hours, an endurance test for men and women already tired from their day's work. Despite these conditions, 550 students received diplomas from the school for regular attendance and more than 1,000 were reached with safety talks at the various sessions.

The expense of conducting these classes was limited to the cost of the literature used and a small entertainment cost. The speakers contributed their services gratis, the hall was obtained rent free and much of the entertainment was secured without cost.

ORGANIZATION

The organization of our first school consisted of the president of the Baltimore Safety Council as chairman ex-officio, an active chairman in charge of the program and presiding officer at school sessions, director of Council, school secretary, enrollment clerks and door men. A school faculty of nine members, selected from officials and members of the Council's Board of Control cooperated actively with those directly charged with the conduct of the school and did splendid service in stimulating enrollments and in contributing to the program. The faculty was representative of Baltimore's leading industrial and commercial interests.

From our experience we can recommend, unreservedly, Safe Drivers' Schools of reasonable sessions and educational inspiring programs as result getting factors in promoting community safety and a proved medium for spreading the good gospel of safeguarding human life.

The second part of the subject, "Community Safety Work," is broad and covers too many branches of activity to be enumerated in this paper. However, effective organization may be referred to as the keystone of such work.

Any community movement which is to accomplish worth while results must have the endorsement and active backing of a leading commercial organization which is representative of the civic and business interests of the community and which is non-sectarian and non-political in character. This applies particularly to community safety work and is evidenced in those cities which are making real progress in this great humane movement. The endorsement by a recognized organization is a certificate of character and assures the citizens of the community that their contributions for the cause will be in reliable hands.

Moreover, those in charge of active operations will receive prompt recognition in their approaches, with considerable saving in time and effort.

As previously indicated, it is conceded by those experienced in the work that the main factor in education, not spasmodic but continuous, starting with the child at home, in the school and at play; also with the man and woman—in the home, at work or as they ride to and fro on duty or pleasure bent.

Community safety work, properly organized along educational lines and permanently established, will reduce accidents and safeguard human life. This, after all, is the appealing fact and requires no argument for its support. Has any community the right to stand aside and keep out of this great movement? Those of us who have experienced the tragedy of accidents unanimously answer "No."

SELLING TAXICAB SAFETY TO THE PUBLIC

WILLIAM G. BEARD, SAFETY DIRECTOR, YELLOW CAB COMPANY, CHICAGO

Selling taxicab safety to the public, I think, is probably one of the biggest jobs that was ever wished on any individual. In the city of Chicago we have a condition which is totally different from conditions in any other place in the world. We have a city divided into five separate and distinct police departments. We have five separate and distinct police forces. They are the City, South Park, Lincoln Park, Rogers Park and West Park. Each one has its own laws varying from 15 to 18 and 20 miles an hour in speed, and each one of them will permit any automobile driver in Chicago to drive up to 30 miles an hour. That, of course is our greatest problem.

Safety on the streets depends entirely on the speed with which motor vehicles are driven. You can talk about safety all you want to but there is only one thing that ever causes an automobile accident and that is that the driver of an automobile is driving so fast he can't stop. That is all.

We started in about three years ago, and were the pioneers of the Safety Movement in the taxicab business. We have tried all the proven methods—nine out of ten of them failed. They failed primarily because the automotive business is so new, its development has been so rapid; it is so widely at variance with any other business in the world that it never had been thoroughly analyzed.

It ran in a parallel with our own taxicab business which grew so fast that we never had time to study it until about three years ago. We arrived at a point finally where, not from a standpoint of humanity, but from a standpoint of dollars and cents coming out of our own pockets, we had to do something. So we started safety work. We got after safety from the angle that most people do get after safety, that is by a lot of rules and regulations. In fact, we made up a little book which a good many of you have seen, entitled "Efficiency" and had many, many variations of the well-known, justly celebrated decalogue.

The taxicab drivers are in business to make money. They are in business exactly as any merchant is in business to make money both by salesmanship and by saving. They have got to do both.

Three years ago we arrived at a point where we had about 800 taxicabs. We also had arrived at another point which created a terrible situation. We had the business but we also had acquired the hatred of the public. We had acquired that because our men were careless and reckless. We acquired it because, in their pursuit of business, they shoved the noses of their cabs under everybody's face, elbowing them off of the streets, and the first condition we had to confront, the first condition we had to cure was our own drivers.

DRIVERS ARE "SOLD" ON SAFETY

We have only been moderately successful. Today we have a little over 5,300 drivers in our company. I think that 95 per cent of these men are sold on the theory of safety from the standpoint of "what do I get out of it? How much money am I going to make if I drive more carefully?" You know that is wrong. You and I and Bill Smith and Tom Jones and the bricklayer and hodcarrier have one impelling motive in this life, one impelling thought behind everything we do and it all comes out to the selfish problem of "What do I get? How much money am I going to make?"

We were able to show our men in the first place that they weren't making as much money as they ought to out of the taxicab business because they weren't making the friends they ought to. We were able to show them that speed in itself is a very small factor in rapidity of city transportation. I am going to give you one example of what I mean.

Nine or ten months ago I took two taxicabs, both driven by old men—put speedometers on them. We made 500 test trips over what in Chicago is the average distance of a taxicab ride—a little over 3.3 miles. One of these men never exceeded 20 miles an hour, the other man drove as fast as he could wherever he could. When we tabulated the figures at the end of the five hundred trips, the average was a trifle under 39 seconds different.

From the beginning we started in then to sell our drivers on the theory of courtesy to everybody else. Courtesy covers the entire field of safety in automotive operation. It covers everything. But, the automobile is so new—it is such a Lulwark against personal attack, and humanity being what humanity is, has failed yet to learn the fundamental of safety on the street, and that is common courtesy.

We have developed our safety angle not on a set of rules, but on a system of publicity to our own men in which we have tried to teach them one thing. There is one rule that is necessary—that is needed—to drive a taxicab with safety and successfully and that is the Golden Rule. In other words, drive your own cab the way you think everybody else ought to drive theirs. That has been fine so far as we have gone.

We have increased the friendship of Chicago with the Yellow Cab Company tremendously, so much so, in the last three years that we have expanded about 14 per cent, due to friendship, but we still have not obtained safety. We still have been unable to sell the safety angle of the taxicab business to the public of Chicago because of a number of factors.

In the first place, as I said, Chicago automobile owners can drive 30 miles an hour any place in the city and get away with it. We have 400,000 automobiles in the city of Chicago, of which we own and control 2,300 or 2,400. We can't make our men slow down when everybody else is driving 30 miles an hour.

We tried at first a series of advertisements in which we outlined the self evident facts. That got us no place. It involved the expenditure of ten or fifteen thousand dollars but got us no place at all until we are now in the analogous position of a taxicab business making a living by carrying the people to and fro, going to the state, city, police and park boards and saying "Cut the speed limit down to 20 miles an hour. We can't stop our own men unless you stop everybody else. It is an impossibility."

Don't you know, the minute we did that we were under suspicion of selling Chicago a gold brick. The public and the newspapers couldn't understand why a corporation would go to the police department and go to the pains of asking that the police enforce a law against its own drivers. They couldn't understand that. I don't think they do yet. But, we have succeeded in doing one thing which is very important to the city of Chicago. We have every newspaper in town, every day, printing a column of the horrors of street traffic.

Now, up to the time I left yesterday, 523 lives had been lost in Chicago since January 1 on our streets. That is going to be at the rate of about 700 a year, which is an increase of 100 over last year.

SLOWER SPEED LIMIT IS SOUGHT

We, and the newspapers, are in the process right now of laying down on the police department for a slower maximum mileage. We want them to drive slower. We want our men to drive 20 miles an hour, or 22 miles an hour at the most, because we know that if they do drive 20 miles they will keep continuously moving. Strange as it may seem, our experiments all prove that the slower the traffic, the greater the speed of delivery. You may have found that yourselves, but our men who go out and drive 20 to 22 miles an hour consistently go out and book the most money consistently. They take in more money, they cover more miles. More of them are "live" paid miles, less of them are "dead." That is the one thing that we are trying to sell in the way of safety.

We are not trying to sell the public on the idea that we are safe—not trying to sell the public on the idea that we are the originators of this proposition, because we are not. It is only common sense—common courtesy.

We have got the newspapers with us. We have got the police with us and it is only a question of a few months now until we slow traffic down in Chicago to the point where it is slowed down in New York City—around 25 miles an hour, or less.

We, at least, have got them to the point now, particularly the speed judges, where they send them to jail; where they assess a big fine. Every time a man is fined, his name gets in the paper. Every time one of our drivers is fined his name not only goes on the bulletin board, but he gets fired.

Being arrested for speeding, in the Yellow Cab Company in Chicago, is just the same as getting a yellow ticket and that is a condition we have gone a long way to make. It isn't easy for a corporation to fire a man, because firing men is expensive. We take a raw recruit—teach him to drive, teach him as well as possible in two or three weeks, to be a taxicab driver. Before he ever takes a nickel in for us we have \$150 to \$200 invested in him. If he goes out, steps on it and gets fired, we lose \$200. We don't want to fire him—we want to keep him. We have just gone this far in selling our own safety to the public. The man who drives our cab and gets arrested has to have \$100 of his own money. Otherwise he goes to a police station and stays there. We won't help him. From his standpoint we do something worse. We have a traffic lawyer who goes to court and prosecutes him. We are really trying, by setting an example, to sell our own theory of safety to the public. As I said before, it is a long, slow process. We don't know how far we are going to get with it. We are going to stay on the job until we do get somewhere.

Many of your companies are in exactly the same fix as we are; with the rest of the traffic moving at a terrific rate of speed, you can't slow your own men down.

I don't think it would hurt the business standing of any of your corporations, to come into court as we have done, not exactly with clean hands, but only slightly soiled, and ask the police and the courts to help, because after all, the only thing that makes 99 out of 100 people decent is distance.

THE TAXICAB BUSINESS AND THE NATIONAL SAFETY COUNCIL

FRED M. ROSSELAND, NATIONAL SAFETY COUNCIL, CHICAGO

I think at the earlier Congresses there were about six sections. We run now about 21 and the end has not come yet. The only requirement for a section is that there be enough members in the line of business for which the section is desired to warrant providing space for them to meet in, to warrant providing the services of the headquarters staff, to warrant the special service which is offered to all sections. No fees are involved, no formalities—no preliminaries of any kind.

What does this mean to the taxicab business? It means something rather different from the meaning to the other sections, especially the industrial sections for your people aren't working in a factory, not in

small groups as in public utilities. It means, because they are working with the public constantly, that the biggest thing you can do at the start in your own community for safety for your own men is to do what has been done so well in a number of cities already, initiate or get back of a community safety organization. If you want a community safety organization in your community, the National Council will help you.

You have another problem. You want to educate the public and your own drivers. The Council does this—it provides educational material for your drivers and furthermore, through the medium of this section, developing its organization still further, you have the opportunity of getting, without any original cost, special educational material prepared by your own people in the taxicab business for taxicab men.

Some taxicab companies take an interest in community safety generally. They want to know about the details of traffic safety, something they can put up to the police department or to the city department handling the streets and highways. We have the information. All that is needed is to drop a line to headquarters and request it. If you propose to carry on your educational work with the public or among your own employees, it doesn't make any difference which, we have motion picture films and other educational material available for your use.

ROUND TABLE DISCUSSION

Mr. G. E. Clarkson (Manager, Western Pennsylvania Division, National Safety Council): Some three or four years ago the taxicab companies in Pittsburgh were doing safety work in an individual way in our city, but, I believe, the effect was not so good as when they got into the local safety council and began their work in a community organization. They carried a number of fine bulletins on their taxicab windows stating specifically "we are cooperating with the National Safety Council in making the streets of the city of Pittsburgh safe."

Mr. H. E. Brosius (Manager, Toledo Safety Council, Toledo, Ohio): I want to tell you what the Yellow Taxicab Company is doing in Toledo, with the idea in mind that it might be of little help in your work. They have organized—I think they have 80 drivers, it is small but rather large for the city—they have organized a council among themselves. They conduct this work just as thoroughly as I conduct the work of the local council and as the National Council does its work. They have taken unto themselves the task of putting across the propaganda of safety among themselves and to the public from their standpoint. It has worked wonders among those 80 drivers.

They independently joined the Toledo Council, each becoming a member at a dollar apiece. They hold their meetings every two weeks and the prominent outstanding features are brought to the attention of the men and they conduct a court, you might call it, and sentence men who have not driven properly or have violated the laws laid down by their own council, so that it has had a lasting effect and is working wonders among their own men.

Mr. W. L. Patterson (of St. Louis Safety Council, St. Louis, Mo.): We have considerable differences in St. Louis from Chicago and other cities; we have a large taxicab company which is practically handling all of the business. We have five companies there.

Up until about two years ago we had the safety organization working very well with the then existing taxicab companies. We had safety organizations in, at that time, the two representative companies, but two years ago this coming January, one of the largest companies (which operated the Yellow and Columbia) drivers went on a strike. For 22 months I tried to hold safety meetings with those taxicab drivers.

We have held our safe drivers' school for four years, both for the commercial car drivers and for lady drivers with a great deal of success. In our last year's schools, we didn't dare bring the taxicab drivers out because there weren't enough police in St. Louis to keep order.

Mr. Beard: We go into the record, into the life history of the man for about 10 years before we hire him, primarily for our own protection. In the first place, we want to know where he has worked and where he has gone to school. We want to know if he is honest and we don't want any letters of recommendation. We send an investigator out who goes to his home and friends. We examine a man physically and mentally and for his eyes.

I don't think anything requires more physical stamina than taxi driving. I don't think a woman would ever be capable of driving one.

Mr. Cloud: The National Association of Taxicabs adopted a code of ethics. You know I am somewhat of an idealist but am practical, and have been working under this code of ethics for three years and realize it has a very practical side. The last line of that code of ethics said, "We will see to it above all things that he (the driver) drives his own vehicle safely." That is subscribed to by 116 owners in the National Association of Taxicab Owners. It is a beautiful piece of work, the whole code of ethics, but it contains a great deal and is being investigated by some of the biggest corporations in the United States today. I have letters from officials. I got a beautiful one from one of the high officials of the Pennsylvania Railroad about that code of ethics.

Mr. Walker: I want to say a word in support of what Mr. Beard told you about cutting down speed. About three months ago in Detroit the police department served notice on the public, through the press, that they were going to reduce the speed limit from 25 to 20 miles an hour. It has resulted in a big reduction in accidents and also of fatalities, and it has developed that there has been no congestion as a result. It has helped congestion as a result and has not decreased the ability to get some place in a given space of time. Traffic is moving better at a reduced rate of speed than before.

APPOINTMENT OF NOMINATING COMMITTEE

Chairman Weibly: I want to announce a committee to nominate officers for this section, the report of this committee to be returned at

this meeting tomorrow. This committee will be composed of Mr. John G. Williams, Mr. William Beard and Mr. W. L. Patterson. Mr. Patterson is the chairman.

THURSDAY MORNING SESSION

Chairman Weibley: The first thing on our program this morning is the report of the nominating committee for officers of this section to serve for the coming year.

Mr. Patterson: We offer, as the officers of this section, Mr. Walker, secretary of the General Necessities Corporation, as chairman; W. L. Patterson, as vice-chairman; C. R. Smith of the Patterson Transfer Company of Memphis, as secretary.

(The report of the nominating committee was accepted and, on motion duly made and seconded, the secretary cast the ballot.)

THE STORY TOLD BY THE ACCIDENT STATISTICS OF THE TAXICAB BUSINESS

J. G. WILLIAMS, SECRETARY, NATIONAL ASSOCIATION OF TAXICAB OWNERS,
CHICAGO

We have, in the taxicab business, collected some figures for three periods or four periods of six months each. We had in mind when we first started out that we would present these figures to the insurance people with the idea of reducing our insurance premium; then we grew to be so interested in accidents, so interested in safety, that we went on and on and accumulated figures with respect to the number of accidents, etc., until we gathered last year our first complete set of accident statistics for a whole year.

We had 100 companies last year. We were able to get complete statistics for forty companies.

We asked our companies to give us the number of accidents causing death and the number of accidents causing serious injuries, such as broken bones, or accidents likely to result in death; and another classification was minor accidents—scratches, cut fingers and such. Then after those accidents relating to death and personal injury, we had property damage—the cost for the company's own property and the cost for the property of other persons. Then, we also asked for the cost of each one of these kinds of death and damage accidents, and then we asked for the person who was injured or killed—whether he happened to be a driver, pedestrian, driver of another car, drivers of both cars, or another person, and then we asked whose fault the accident happened to be, whether the driver, the driver of another car, passenger, pedestrian, and so on down, in each case giving the amount of money actually paid and estimated to be paid on account of these particular accidents.

When we approach the insurance companies with these figures they tell us we haven't anything like so much experience as they have, and having a bare quantity of miles run, accidents connected with those

miles and costs of settling the whole thing, they base their rate of premium, so they say, on their own experience, and as a result we have well organized, carefully run, carefully managed and discriminating taxicab companies charged the same rate of premium as careless, negligent, thriftless and ignorant people combined. They have all this great mass of taxicab drivers under one and they average that up and then charge us a rate based upon that kind of service.

The average cost we have found per car (and I will say in passing that none of these figures have any reference to the Yellow Cab Company of Chicago) per year for personal injury runs between \$85 and \$110, and in a great many places the premium is \$300, \$350 and \$600 and in New York it is \$900 a car, and our experience shows us that all the companies that we can find connected with these cars in which we can get actual and reliable data will run around \$100.

Suppose you gentlemen in the delivery section would give us figures to go with our taxicabs, and with the transfer wagons and trucks that our companies run (probably we have 25 or 30 companies also in the transfer business) we can put all that data together and from time to time we can gather information that will be instructive to us and helpful in our business.

Many of our taxicab companies do not buy their insurance, they carry it themselves. To give you an example—the Terminal Taxicab Company in Washington found that they paid the insurance companies about \$110 to \$125 a car a year to handle their insurance. They then charged \$110 a car a year to their expenses and set it on the credit side as a reserve and now in a period of something like 10 years, I believe, they have accumulated an insurance reserve to pay their own claims, of \$75,000. They don't have any worry at all about the accidents that happen. They have the money and they have beat the insurance companies to it simply by keeping the premiums themselves, having the nerve to take those chances and set up the reserve, and they built up a very excellent reserve.

Mr. Weibley's company in Pittsburgh did the same thing only it didn't extend over so many years. Mr. Murray in Detroit did the same thing and was able to pay his accidents out of his own charges and have money left.

Mr. Reel's insurance for four or five years has run something like \$83 a car, if I remember correctly, or one-third of a cent a mile. I think that is the way I remember it. Now, in Des Moines he probably would have to pay \$300 a car to insure the car, maybe not so much if he gets the insurance company down to look at his experience. Your records will prove valuable here.

Here is one thing that our statistics do show. We have talked, and we heard Mr. Beard talk yesterday about the driver, and every time any mention is made of safety business we talk about it, but the statistics that we gathered last year show us that not one half of all of the accidents we had in the taxicab business were due to the driver's fault.

Here is another curious thing that those statistics show, that 20 per cent of the deaths are to drivers themselves. One man in every five of all of those people who lose their lives during the year by taxicabs are drivers.

I believe a driver can be so instructed that his every thought, or in other words, every reaction in that man's mind is so organized that safety will work. That will be the first impulse, sensation, thought, and he will produce that reaction of safe driving. That is what I believe and I believe, if we keep along this educational line, that we will have everybody falling in line. With our driver's school, we can get them to drive safely.

I was walking home with Judge Stafford; he is a very learned judge. He lives across the street from me. I was walking home with him and we were talking about taxicabs, driving cars, and that sort of thing. The Judge said:

"When I walk along the street and meet a gentleman or lady and if I am about to run into them, I step aside, and if I bump against someone I instinctively say 'I beg your pardon' and step aside, and really I believe I live among my fellowmen with a reasonable degree of courtesy and decency, but, the minute I get into an automobile I am transformed and want to say to every human being I see in my way 'damn you, get out of my way'."

That is exactly what the spirit of safety isn't.

PAYING A BONUS FOR GOOD NO-ACCIDENT RECORDS

JOHN W. WEIBLEY, TREASURER, PITTSBURGH TAXIMETER COMPANY,
PITTSBURGH, PA.

Justly deserving of much praise, Pittsburgh can be proud of many things which might be summed up at great length. But here are some things she cannot boast of. She cannot claim broad, level, straight streets. Her streets are narrow, hilly, crooked and with few exceptions paved with cobbles,—all of which does not make for easy, safe and economical operation of motor vehicles.

Of course you know that for fourteen years I have been engaged in the operation of taxicabs in Pittsburgh. To stick in the cab business and keep ahead of the sheriff has meant that we had to do some safety work. Yes, we have bought or borrowed every safety idea that anyone could offer, and many were very good. And our "botted down" experience amounts to this—that paying a reward for good records gave us the best results of all the things tried.

Now, let us go into the psychology of the matter. Since the beginning of time, in every walk of life, in government, in business, in family life, when all other methods fail, we have had recourse to the "reward" or prize—nowadays called the bonus. We all of us work for a reward of some sort or other. Why not a cab driver? He's a very much abused fellow—the cab driver. One man cusses him because he drives too fast. The next fellow cusses him because he drives too slow. Most people doubt his

honesty. He seldom gets a kind word because he is expected to know the shortest distance between every two points in the world. He has a pretty tough life. He sees life as no other class of men see it. Rich people, poor people, good people, bad people,—good people when they are bad, or when they are mad or intoxicated. What other set of men sees life as he does? He has problems that do not confront the street car operators, railroad men, bus or truck drivers. His work is absolutely different from any other work that I know. His work is not a work to make a sweet tempered individual, and he, more than any man I know will respond to a reward for a good accident record. I have good reason to believe this, because I have had a practical demonstration of the results obtained by the Pittsburgh Taxicab Company during the past year.

BONUS MORE INFLUENTIAL THAN ALL OTHER MEANS COMBINED

The no-accident bonus did more to reduce accidents than anything we ever tried,—or rather, let me put it another way—it did more than all other things put together.

Our rules at first were very simple. We appropriated five dollars per cab per month to be divided among the men who had a clean record. It is very interesting to follow the changes in the rules as we went along.

Soon we found that in order to put all the men on an equal basis, it would not be fair to pay the men the reward who had not worked a full month. So the rule was changed to require that a man must work 26 days in a 31 day month to qualify.

Next we found that men who worked hard,—who were always alert for business, traveled twice as many miles as the men who were careful but lazy. So a new rule was added requiring a certain amount of business before they could qualify.

Then we found a certain group of men who worked for the bonus, but looked on it as easy money to be squandered. So the rules were changed again and a rule added that seemed foreign to the cause. When this rule went into effect, the bonus was deposited as the beginning of a saving account in a well-known bank. Then the next month, in order to qualify, a man must deposit an amount equal to fifty per cent of the previous month's bonus in this account. Then the real results began to show. The men became very proud of these bank accounts and the bank book was a badge of honor among them. When the account grew, the man became a different fellow. You know the first hundred dollars is harder to get than the first thousand.

These men are now using these accounts to become stockholders in the company.

If you are not paying a no-accident bonus, start at once! Because first, it will pay for itself, second, it will give you so much more time to develop your business. You know, and I know that accidents are the most discouraging thing in the cab business.

Start out first by laying aside five dollars per cab per month. Make the rules very simple and change them as you go along. It is not a bad thing to have a new rule added each month, especially if you increase the bonus, which you will soon find that you can afford to do. A slight change each month stimulates the interest of the men.

Try to put a rule into effect that will cause the men to save this money. Because just as soon as a man has over a hundred dollars to his credit in a bank he has a different outlook on life. It takes the Bolsheviki out of him. Elbert Hubbard used to say the way to cure an anarchist was to give him a house and lot.

Make your own rules, but make a start and you will never regret it.

DISCUSSION

Mr. Patterson: I would like to ask a question on that bonus. Does that mean any kind of a property damage accident, whether it is the driver's fault or not?

Chairman Weibley: There may be a few isolated cases where a man is not to blame, but it opens up the way for discussion. He has the accident, that is all there is to it. Of course, he feels absolutely it was the other fellow's fault, but we have got to show him that it is his misfortune.

Mr. Patterson: The reason I asked that question was that I have had that put up to me a good many times. In the study of the causes of accidents. I have found this to be a fact, that in 60 per cent of the accidents, if either one had used the proper degree of caution, the accident wouldn't have happened, and in 90 per cent if both of them had used a reasonable degree of caution, the accident wouldn't have occurred.

There is just one other thing I might bring out here. Careful driving is nothing but habit.

Mr. Russel Reel (Yellow Cab Company, Des Moines, Iowa): We have tried in perhaps three or four years, a dozen different bonus systems and for the last year we have used a system which we think is the best.

We have a big bulletin board, and every week we credit 10 per cent of every man's salary on the bulletin. If you make \$27.50 you are credited with \$2.75. We carry both property and liability insurance. We have reduced our accidents from an average of \$83 a year to an average of \$69 a year, which is a saving to the insurance companies to say nothing of us.

A man doesn't get his 10 per cent until it amounts to \$25, and it has worked out very satisfactory to us.

Mr. G. E. Bush (Safety Committee, Chamber of Commerce, Duluth): Do you find that your drivers report accidents?

Mr. Reel: The drivers report them as promptly as ever. They always do report them. This is one thing they do under the bonus system—a driver will say, "Have you a release that I can get," and I say, "Yes."

He will say, "I just hit a man's fender; I want him to sign it; he might make a claim." If that man were allowed to stand, he would make a claim against us.

Chairman Weibley: In our own experience we had a few isolated cases of men not reporting accidents. They don't get very far with it.

Mr. Malloy: Does the bonus system extend to the repair men?

Chairman Weibley: Yes, in our company it does. We set aside one-fifth of the net earnings of the company to be divided between all the employees. The repair department does not get in on the no-accident bonus. They get in on the other bonus.

In the cab business the bonus is used extensively for this reason. It is better than increasing wages. The incompetent fellow who only sticks a little while is eliminated, and if he is any good, he sticks long enough to earn his bonus. We have found in the cab business that this is a very excellent way of paying the men who deserve it and not paying those who don't.

ADJOURNMENT.

Textile Section

October 3, 1923

FRANK E. MORRIS, Chairman

Safety Engineer, Mutual Insurance Company, Boston, Mass.

H. M. BURKE, Vice-Chairman

Plant Engineer, Mount Hope Finishing Company, North Dighton, Mass.

SIDNEY B. INGHAM, Secretary

Ludlow Manufacturing Associates, Ludlow, Mass.

CHAIRMAN MORRIS: One of the first jobs of a chairman in a meeting of this kind is to appoint a nominating committee to select officers for the following year and I am going to appoint Mr. B. M. Self of the Travelers Insurance Company; Mr. W. A. Dearborn, chief engineer, Federal Mutual Liability Insurance Company, and Mr. Raymond B. Sherman of the United States Finishing Company.

DOES SAFETY WORK IN THE TEXTILE PLANT PAY?

HARVEY SAUL, THE UNITED STATES FINISHING COMPANY, PROVIDENCE, R. I.

Before going into the subject we might better come to some understanding as to our meaning of profitable safety work. If we should ask some of our social service friends what dividends we might have a right to expect from safety work we would probably be told that our return would be in the prevention of suffering and possibly the saving of life. Truly the saving of a life, or lives, is a good reward for our efforts. On the other hand would such a return on a financial expenditure interest the average business man if along with it there was no financial return?

I can well recall the hundreds of good women wearing their little white ribbons and telling us that the use of intoxicating liquor caused suffering and misery but it is not true that our now famous 18th amendment was given very little serious thought until large employers discovered that intoxicating liquor hindered production, and, because it is an economic waste, I do not expect to see any change in this constitutional amendment.

We are likewise learning that accidents are an economic waste, retarding production and lowering quality and, therefore, must be eliminated. It may not appear so uplifting to place safety on a dollars and cents

basis, but is not business organized for the purpose of its financial returns? This too, might be questioned by some. Just recently Mr. Arthur Young, past president of our National Safety Council frankly stated that "the dollar side of safety has been an important factor" in his safety work. He further states that he does not blush for reducing safety work to a basis of dollars and cents.

And then we hear a great deal these days about the commercial value of manufacturing enterprises being operated on the Golden Rule basis, so it seems perfectly proper that we should consider the financial value of safety.

Safety work in any industry pays if it reduces accidents. In making this statement I am well aware of the fact that it would not be considered profitable to spend say, \$10,000 on safety work and reduce accidents that might show only a cost of \$500, but up to this time I have not heard of anyone who squanders money on safety work. Perhaps, then, we might better say that *intelligently directed* safety work pays.

It is fair to assume that an employer makes, or should make, some profit on each employee, otherwise the unprofitable employee would not be retained. Therefore is it not reasonable to assume that the absence of an employee from work because of injury represents a financial loss to the employer? In collecting facts for this discussion, I learned that one textile plant estimates the worth of a man's time to them at \$7.50 a day and that his absence from work represents a like amount. We do know that absence from work means lost production. As a concrete example, less than one month ago I asked the foreman at one of our plants how a certain accident requiring the loss of three or four days time affected his production and was told that it meant a loss of 5,000 yards of cloth each day during the injured man's absence. A few months ago one of our stitchers in the sheet making department fell and injured herself and we lost the production of 40 dozens of sheets a day during her absence. These are not extreme cases.

LOST TIME REPRESENTS PRODUCTION LOSS

I am told that the severity rate in our company is 50 per cent. lower than the average rate for the industry as a whole, so I do not hesitate to say that over 3,000 days were lost by our company through accidents last year. This year our record to date shows a 15 per cent. decrease over last year or 450 days saved over last year. To reduce this to a yardage or dozen sheets basis this saving would represent an additional production of 500 yards a day for 450 days or 225,000 yards of cloth, or at 40 dozens of sheets a day it would represent 18,000 more dozens of sheets. Or to use the figure just quoted as used by one textile plant of \$7.50 a day, these 450 days saved represents an additional income to the company of \$3375. And just for a moment let us consider that 450 days of wages more will go into homes than went last year because of the reduction of accidents.

I find that one textile plant has reduced their severity rate over 80 per cent. in two years, which if applied in our own record of last year would have meant a saving of more than 2500 days. I rather suspect that 2500 additional days production would have made some difference in our production.

Another textile plant makes the statement that over \$3,000 a year is being saved in cash compensation insurance premiums through their accident reduction, to say nothing of the days saved. I also know what it means to have a set of two to twelve looms stopped because of an injured weaver or spinning frame stopped due to an injured spinner.

Regardless of the occupation, an absent worker represents a task not done, which reacts directly or indirectly on the total output. Profits accrue from goods shipped but there are certain fixed charges that must be paid before profits are realized, neither of which can be expected from idle machinery and equipment or unused floor space.

Incidental reference has been made to our own safety interest in The United States Finishing Company but since there is nothing unusual or spectacular about it, I shall not take any time to talk about it except to say that among our six plants we find that 76 per cent of our accidents are due to non-mechanical causes and 24 per cent to so-called mechanical causes indicating that three-quarters of our accidents can only be eliminated by careful workmen and our efforts are expended in education.

One point I should like to make about our work: It might appear that we are making progress, and we are, but safety work has not been "put over" in our organization by any means. It is just moving ahead and is now at the stage where it could go backward more easily than forward. In other words, safety has not yet become a habit with us. We believe, however, that safety work pays and we back up our belief by the exertion of effort and the expenditure of considerable money.

DISCUSSION

Mr. D. Dunkerley (Imperial Cotton Company, Hamilton, Ontario, Canada): We have been carrying on safety work for the last four or five years. In the first place, there is the committee management and officers and myself as an independent representative. I represent either officers or employees. I have been in charge of the safety committees. The safety committees are called together bi-weekly. Of course we have seven, eight or nine sections. We take one representative from each section. The recommendations and suggestions are made and monthly, this same committee, the sections of the different branches taken from the various floors, inspect the mill.

Their suggestions are passed on to the overseers and management to consider and to a large degree, wherever possible, are adopted. I want to say the management is 100 per cent behind the movement.

Mr. Sidney Ash (General Electrical Company): How do you get your educational work to the people—through personal contact?

Mr. D. Dunkerley (Hamilton, Ontario, Canada): Yes, we get them through the people. The safety men wear buttons and we change the committees every three months.

Mr. Howard L. Cates (Lawrence, Mass.): Mr. Saul tells us of the method he employed. I wish he would tell us how he has reduced the percentage so low.

Mr. Harvey Saul: To reduce accidents you cannot follow any specific policy. We tried to but we found at one plant it would be one cause and at another plant it would be something else. We use bulletins—we make our own bulletins. At one plant we just completed a new hospital and we arranged to have every employee in the plant see it during working hours. It takes about 10 minutes to do it. If it is a large department we split the groups up and place them in charge of sub-foremen. They go down and examine the hospital. It is more than a first aid section.

The purpose of the hospital was explained to them. We told them we thought this was a good place to come to when injured but we hoped they would not have to make use of it.

I feel that if we have made any progress, and apparently we have from comparison with other companies, it has been due to individual effort striking at the cause of the matter.

Mr. Harry C. Sabonjian (Bellman Brook Bleachery Company, Fairview, N. J.): We have about 400 employees and we have a safety organization. In 1922 we ran a safety week and we went one month without an accident and previous to that we had four accidents a week. It can be done if you will try it. The organization has donated \$1.00 for every 24 hours that goes along without an accident. That money goes to the welfare department and of course that goes to the employees.

Infection is the big cause. If they have a crash, infection sets in. Blood poison follows and that means time lost. We send a general notice to all head foremen of all scratches, etc. wherever found and no matter how small. The foreman tells the employees they should go to the first aid section at once and in that way we prevent infection.

Mr. Everett F. King (H. A. Hale, Jr. & Co., Boston): I was glad to hear Mr. Saul say that the employees visit the hospital in a group and I would like to know how that is arranged. How is it arranged among the new employees? Do you have 40 or 50 come into the plant once a week? Do you take them all down together?

SHOWING THE PLANT DISPENSARY TO THE NEW EMPLOYEE

Mr. Harvey Saul: That is a matter we have not taken care of but we plan to take care of it. What we expect to do is to have one day a week designated as visiting day for new employees. We are planning for that.

The foremen will be supplied with a list of the new employees who have been hired and they will be taken to the new hospital and receive instructions as to its use.

Mr. John Rennie (Joseph Bancroft & Sons Co., Philadelphia): Do all new employees go to your hospital for examination during the first 24 hours?

Mr. Harvey Saul: They should report for examination during the first 24 hours.

Our next speaker is going to tell us about organizing the human element for safety in the textile industry. Now when the program committee determined upon this subject we looked over the field of available speakers and we were unanimous in our choice of Mr. I. McNulty of the Department of Labor, American Woolen Company, Lawrence, Mass., to present this paper to you.

ORGANIZING THE HUMAN ELEMENT FOR SAFETY IN THE TEXTILE INDUSTRY

I. MCNULTY, DEPARTMENT OF LABOR, AMERICAN WOOLEN COMPANY,
LAWRENCE, MASS.

In establishing a permanent safety program in a textile factory it is first of all essential to "sell" the idea to the employees. There is an opinion among average employees that anything brought into a mill from "on high" is an attempt to "put something over on them." For this reason it is very necessary, in bringing in a program of this kind, that it be done ostensibly through the employees, thus removing one of the obstacles confronting the management of the mills in undertaking such an idea. In our mills the first step was to invite groups, representing different departments and crafts, to come together. When this was brought about it was explained to them that the program about to be introduced in the mills must be endorsed by themselves, as it is the employee who suffers the most from accident and, as it had a very keen significance to him socially and domestically, his duty was to devise ways and means whereby accidents might be reduced in his department. The first effort was thus made to build up a safety organization.

First of all, with the permission of the local management, representatives of each mill and department were assembled during working hours. The safety engineer explained to them the purposes of the meeting, suggestion cards being placed in the hands of every man and woman present on which they were to write their ideas of the risks and hazards encountered in the course of their employment in the mills. When the employees found out that they were vested with this advisory right and suggestive power, it was not very difficult to get them interested in the idea of safety, and in requesting that a program be installed. Groups of the employees were formed into committees from the mechanical and non-mechanical departments in the mills and suggestions began to come in from them and were discussed at the appointed meetings of the committee. All suggestions that met with the approval of these committees as being worthy of further consideration were later taken up and discussed by committees of foremen from the mechanical and non-mechanical departments, who were in a position to judge whether the recommendations were worthy of being carried out. There are instances sometimes where manufacturing problems, unknown to the ordinary operative, make it impossible to adopt some suggestions, but when suggestions are re-

ceived by a foremen's committee that tend towards the safety and welfare of a department, the suggestions are approved and sent to the management of the mill, composed of the agent and his superintendents, who determine whether or not the suggestions are to be carried out. Needless to say that when the first groups of the employees saw the mechanical departments of their respective mills, working within a few days on suggestions they had made, it encouraged them to bring in additional safety suggestions from time to time, thus reasonably solving the problem, so much so, that in the Lawrence mills of the American Woolen Company, in one year's trial, the number of compensatable accident cases were reduced to the extent of 22 per cent.

MAKE-UP OF THE COMMITTEES

General Committee: This committee consists of the plant agent, assistant agent, superintendents, master mechanic. The duties of this committee are to consider and pass on all suggestions and recommendations forwarded by the overseers' and employees' committees, especially where the feature recommended would cost considerable money. Any intelligent and practical suggestion is never refused. When this policy is carried out, employees will realize that the management is sincere and will therefore take greater interest in the organization. All accidents of long standing are reviewed by this committee; also all reports that the safety engineer has to make to the progress of the work.

Overseers' Committee: This is composed of the overseers from every department and meetings are held once a month the same as those of the general committee. Their duties are to pass on any minor recommendations forwarded by the employees, and to discuss accidents with the purpose of finding a means of prevention. In this way they have the opportunity of knowing what sort of suggestions and accidents are being reported from other departments, and can perhaps forestall similar ones in their own rooms.

Workers' Committee: Members for this committee are appointed from among the second hands or other employees generally, men or women, for a term of three months. Each department is represented, and for large sections there are larger representations. One-third of each committee is retired every month after completing three months' service. This committee makes recommendations relating to safety, and also transmits to the employees suggestions relative to the promulgation of safety work in all sections of the plant. The safety engineer and a member from the labor department are present at all meetings of all committees, the safety engineer acting as chairman of the employees' committee and secretary to all other committees.

Every committee member, from all three branches, receives a button to wear, indicating to the other workers in his or her room that he or she is a safety member and as such can be approached on any matter pertaining to safety. Bulletins are printed illustrating dangerous practices in each department and their consequences; also the safe way of doing things. They are posted in each department in a prominent place. Inspections

are made twice a week by the plant inspector and hazards reported. Pictures of accidents are taken, staged as they actually happened as nearly as possible. These are later made into bulletins and stereopticon slides. The slides are shown noon hours to all employees who care to attend and also at all safety meetings. Usually a good moving picture comedy is shown at noon to draw a large crowd. Moving pictures are taken of accidents staged as realistically as possible. These moving pictures are also shown during the noon hours and cause a great deal of interest and talk throughout the mills. Suggestion boxes are placed in various parts of the mills and any employee may drop cards furnished for that purpose in these boxes. Clocks designed to show the number of accidents each month are placed at the mill entrance, and each time an accident occurs the hand of the clock moves forward.

ACCIDENTS SOON REACH MINIMUM

All of these things, of course, produce a psychological effect on the minds of the workers. In the course of six months a considerable decrease in the number of accidents and days lost has been noticed. In a year's time accident rates have been brought down one-half of their former number, until eventually they have been reduced to a minimum.

After guarding every possible hazard we could detect on the machinery we found that certain individuals were still being hurt. Thereupon we made an intensive study of these individuals both at their work and at home, and found that the causes of accidents to these people usually arose from nervous impatience, eagerness to excel, over-hurrying in piece work for extra financial gain, youthful recklessness, inattentiveness and other inherent characteristics of the individual. Also, temporary conditions, such as fatigue from insufficient rest and nourishment, illness or extra work outside the plant, and worry about matters not pertaining to work in the plant was found to obtain in these cases. In order to overcome these causes, special bulletins, lantern slides and moving pictures covering the subject are shown, and the overseer in a diplomatic way tries to show the individual his faults and the consequences. It has been found that the overseer is the best man fitted for this, as he has the confidence of his employees and a first-hand knowledge of their faults and troubles that no one else could get.

Another method used to bring safety to the minds of the workers is through the medium of the company magazine which is issued once a month. Pictures of actual accidents staged, with attending explanations, and articles on safety that even the simplest mind can grasp, all help to keep up interest. First-aid rooms are established in each mill with registered nurses and up-to-date equipment of all kinds. Treatment given at these hospitals has been found to save thousands of days of lost time and cases of blood poisoning have become a rare thing.

At all field days held by the company, safety pageants are staged, which cause a great many laughs and keep tongues wagging in the mills for a good many days. At the summer camp for children of employees, safety committees are formed and interesting lectures are given to the children

throughout the summer. Hundreds of children pass through this camp every summer. A good many of them are future employees of the company, so an advantage is gained by having hundreds of new employees pouring into the mills fully trained in the principles of safety. Not only that, but after leaving the camp they go home and talk safety to their parents, which tends to make the latter safer workers in the mills.

DISCUSSION

Mr. Sidney Ash (General Electric Company): You spoke of tuberculosis in your factories. I was wondering in a factory of 6,000 how many active cases you had and whether you had any objection to having these cases work? The reason I raise that point is we felt at Pittsfield we shouldn't allow an active case of tuberculosis to work. Yet, in another factory they had quite a number and they seemed to feel that there wasn't danger there.

Mr. I. MacNulty (Lawrence, Mass.): I went over several hundred cases here. I am sorry we didn't bring sick statistics with us, but speaking from memory, after going over several hundred cases in which we pay them for being sick, the sole authority for their being sick being determined by their doctor, we found very few cases. Our company is generous by allowing their doctor to be the authority. We have no factory doctor. Despite that fact we couldn't come across but very, very few cases where the doctor prescribed it as a lung case. I believe there were but two cases. It was not put down as tuberculosis. Personally, I came across but one case. It was the case of a young man in the mill, who has since died. He came from a construction company and worked in the mill six months, long enough to get sick disability. I took care of him myself. That is the only case from tuberculosis and he was not working long enough to get tuberculosis in our plant.

REPORT OF THE TEXTILE SAFETY CODE COMMITTEE

W. E. DEARBORN

It is quite reasonable to suppose that some progress has been made but because of the vacation period and the generally unsettled conditions prevailing in the textile industry during the past summer, the cooperation expected has not been as complete as it was hoped.

It therefore remains the duty of the sub-chairmen to secure sufficient additional members to fill out their committees and to proceed without delay with the first rough draft of each individual part of the code.

The sub-committee chairmen are S. E. Whiting, Liberty Mutual Life Insurance Company, for the cotton division; MacNulty, American Woolen Company, for the woolen division, and Everett King, Henry A. Hale, Jr. & Company, for the worsted division. The finishing and dyeing division has no sub-chairman at present but it was thought by using the Pennsylvania code on that subject as a start, a suitable committee could be secured at the time the first rough drafts come up for review.

DISCUSSION

Chairman Morris: It is understood this code committee is a permanent organization. It has a big job. The members are not going to try to get it out in two or three months. They are going to work. They are going to get all of the members of the Textile Section who have registered at this congress and solicit their assistance.

All branches are going to be represented and when you get a request for help dig into your files and get the information that they need because we have all got to pull together to put this across and do a good finished job.

Mr. Sidney Ash: Mr. Dunkerley, do you have any trouble in keeping your committees working? Do you have your committee meetings on company time and do you have some trouble in having them attend the meetings?

Mr. D. Dunkerley (Hamilton, Ontario, Canada): Yes, we have difficulty. Some attend and others gradually drop out.

Mr. Everett F. King: I think it isn't the fault of the operator not wanting to go to the meeting. They forget about the different dates of the meetings. I think, if you are going to have safety organization meetings, you should print a schedule and in addition notify the overseers to notify the workers. I find most workers are always glad to come to the meetings.

Mr. Regula (Liberty Mutual Insurance Co., New York City): May I ask if that is a workman's or a foreman's meeting?

Mr. Dunkerley: It is a workman's meeting.

Mr. Regula: It has been my experience that the laxity on the workman's committee is not a lack of desire but often due to the fact that the foreman of the plant has not been sold on the safety committee idea and does not encourage the employees on the workmen's committee. If you have got your foreman sold on the committee idea you find invariably they will see to it that the workmen have their department represented on that committee, not alone attending but reporting to them later as to what transpired at the meeting.

Mr. W. A. Dearborn: I think slippery floors is a pretty serious condition.

Mr. John Rennie: How do you handle that? We put it up to the foremen. If any accident happens due to slippery floors we ask the foreman why the floors are in such condition. He reports on all conditions. We do have slippery floors in some places.

Mr. J. MacNulty: That problem used to bother us and was considered serious. We met that this way in one mill. We analyzed every room that had accidents on floors. We found 29 per cent of them were due to slippery floors.

Mr. Everett F. King: Where we had large aisles we asked the assistants to scrub one-half of the aisle at a time, keeping the other half

dry. We tried a scrubbing compound instead of soap. We used a compound that left a gritty surface on the floor. It worked out fine. The scrubbers were issued instructions to use a cup full of compound to a pail of water and in that way it left the floor without this slippery film.

REPORT OF NOMINATING COMMITTEE

Mr. B. H. Self (Travelers Insurance Company): ? ? . ? ? ??

We have picked out a slate which I will submit for your approval consisting of the following:

Chairman, Harvey Saul, U. S. Finishing Co., Providence, R. I.

Secretary, Grant Cook, Supervising Inspector, Travelers' Insurance Co.

Vice-Chairman, Harvey Donald, American Mutual Liability Ins. Co., Boston.

(The report was adopted unanimously and the secretary cast the ballot.)

ADJOURNMENT.

Woodworking Section

October 2, 3, 4, 1923

WALTER S. PAINE, Chairman

Research Engineer, Aetna Life Insurance Company, Hartford, Conn.

G. E. SANFORD, Vice-Chairman

Safety Engineer, General Electric Company, West Lynn., Mass.

E. ROSS FARRA, Secretary

American Car and Foundry Company, Wilmington, Del.

TUESDAY AFTERNOON SESSION

CHAIRMAN PAINE: During the year we have responded to a number of requests for safeguards in the woodworking industry and these requests consist chiefly of guards for the point of operation. The saw, jointer and shaper seem to be the three outstanding problems in the accident prevention work of the woodworking industry as a whole.

A review of \$9,000,000 of losses under Workmen's Compensation insurance covering the majority of industries indicates that the point of operation in the woodworking industry is one of the most prolific causes of losses. Another fact brought out by this data is that in this industry more than 40 per cent of the losses were directly traceable to the point of operation on woodworking machines.

An accident cause code, requested by this section, has been drawn up and submitted to the secretary, E. Ross Farra. This work was done in conjunction with the National Council on Workmen's Compensation Insurance. Your chairman would suggest that a committee be continued next year to further review this subject if, in the minds of the sub-committee, the code presented does not suffice.

If it is possible to run more articles in the *National Safety News* during the coming year on the problems of the woodworking plant I know of no better method of investing our time to further the work of this section. This, however, can only be accomplished by the cooperation of the members in the Woodworking Section

REPORT OF SECRETARY

E. ROSS FARRA

The records show that we secured 53 members during the last year and lost 53. We still have 345 members. If there is any one here who is not a member of the Woodworking Section, I wish you would give me your name before you go, as I would like to have you on the roll.

Chairman Paine: The Committee on Statistical Data has already published its report.

As a nominating committee for the choosing of officers for the ensuing year, I name the following: Mr. Albert Regula, chairman; Mr. J. M. Sandel, Mr. H. G. Wiberg, and Mr. Milne.

CIRCULAR SAWS AND SHAPERS

DISCUSSION LED BY C. B. AUDEL, EMPLOYEES SERVICE DEPARTMENT, WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, EAST PITTSBURGH, PA.

I know of no class of machinery that is so difficult to guard nor no class of machinery in which the hazards are so deadly as that of the woodworking establishment. I feel today that we are about where we were eight or ten years ago on punch press guarding. I recall being invited by the commissioner of labor of Pennsylvania to aid in the formulation of a punch press code, and, after several days' deliberation, we didn't have enough to fill two sheets of paper. It was in the past year, largely due to the efforts of Mr. S. J. Williams, chief engineer, National Safety Council, that a well-worth-while code has been outlined, one which a few years ago I would not have thought possible.

As far as I can see we are not very far along in the safeguarding of woodworking tools generally. I hope the same thing will happen in the course of the next few years that has already happened in the guarding of punch press tools. I suppose the hazards are so deadly because we are dealing with extremely high speed tools, and because many of the tools are for general purpose work. I think when you say a tool is for general purpose work it at once brings to the mind such a great variety of uses it is almost impossible to devise a guard that will serve all purposes.

In the development of our circular saw guard, our company has spent more than \$3,000. We could have gone on the market and bought a commercial guard for not more than \$50. Now we have a factory inspector who comes to our establishment, looks at our guards and says that they are very pretty but there are more tools that need guarding. We get no more credit, if you please, for the development of this really ingenious guard than if we had bought a \$50 guard on the market. We are told that we are to be given 35 or 60 days more to get a guard on the balance of these tools or they will have to shut us down.

It seems to me, and the same remark applies to insurance companies, that real ingenuity in the development of guards should be recognized by a material reduction in the premiums. That may require some ingenuity in working it out in a practical way, but I feel mistakes are being made in not encouraging the development by the various users of these tools that ingenuity which lays dormant and waits, if you please, an incentive to be brought to the surface. I don't know why the idea has not occurred to me before, but I have recently thought we would put an advertisement right on the walls of our woodworking department

and call attention to the workers that we are willing to make substantial awards for any suggestions that will enable us to improve our woodworking guards or offer some solution in regard to tools that we are not able to guard at all.

(Demonstrates Circular Saw Guard.)

Mr. Milne: How would you prevent a kick-back on the long piece?

Mr. Auel: I have never heard of anybody getting hurt from a back-kick in our work.

Mr. Mason (The Packard Company): With the guard over the top of the saw you rarely get a back-kick. A back-kick occurs mostly from the object dropping on the top of the saw.

Mr. Freudenrich (James Elgar Insurance Co.): If you mounted that on separate pedestals it would affect the tipping table, would it not?

Mr. Auel: You see it would not work if this were upright and the table tilted.

Secretary Farra: Do you ever have the complaint that the guard is too heavy?

Mr. Auel: We originally did have the complaint that the guard was too heavy, so instead of making the centerpiece outside of wood we made it out of what we call macada. It is really a series of sheets of paper that are held together by a form of shellac, packed under heavy pressure, which makes the nose very light. The blades we have made of aluminum.

KICK-BACK

Mr. Goodspeed: I would like to bring out one principle you have not emphasized in connection with the kick-back. If you have the splitter, you have practically eliminated the possibility of kick-back.

Mr. Auel: The point was brought up that it might occur due to meeting a knot before the board reached the splitter. The splitter does tend to prevent the pinching of the board on the saw.

Mr. J. F. Middleton (General Electric Company, Pittsfield Works): Have you ever tried that on cross-cut work?

Mr. Auel: It is merely a rip saw. We have another saw guard for our cross-cut saws, that is our traveling cross-cut saws. I have one more safeguard. I am not so positive as to the merits of this as I am of our circular saw guard, because it is quite new. It is a shaper guard.

(Demonstrates shaper guard.)

Secretary Farra: How would you operate that where you didn't use a guide?

Mr. Auel: You can't devise a guard that will answer every requirement. That makes the woodworking hazards really more deadly than any other class of hazards that exist.

WEDNESDAY MORNING SESSION

Chairman Paine: It gives me great pleasure to introduce Mr. John L. Thompson, Chief Engineer of the Travelers' Insurance Company.

HOW TO ORGANIZE FOR SAFETY IN A WOOD- WORKING PLANT

JOHN L. THOMPSON, SUPERINTENDENT, ENGINEERING AND INSPECTION
DIVISION, TRAVELERS INSURANCE CO., HARTFORD, CONN.

A safety organization in a woodworking plant so far as I have been able to observe is not unlike a safety organization in any other kind of manufacturing plant. Every organization has its individualities, but it has been my observation that these variations are not in any way due to different products and processes. As a rule any individuality is the result of ideas of the members of the safety organization and follows their conception of how the best results can be obtained in their plant.

Nearly every industry of any size has a woodworking department. Here in a small way we find the same machines, the same class of work and the same general equipment that we find in the plant engaged exclusively in woodworking operations. The members of this small woodworking department in the average industry are usually found to be active members of the organization for safety of the entire plant. This is proof in itself, if indeed any proof is necessary, that woodworking establishments are susceptible to organization for safety. I feel, then, that this paper should cover the subject of organized safety in a broader sense and I will attempt to deal with fundamental principles that can be applied in any kind of plant.

THE FUNDAMENTALS OF SAFETY ORGANIZATION

First, safety must be on an organized basis. The head of the concern must believe this and be willing to back his belief with personal effort. He must recognize this fact by creating a department in his organization for safety work.

Second, the whole-hearted cooperation of every executive, foreman and supervisor in the plant should be obtained at a special meeting for foremen only, at which time the principles of the organization work and its purposes should be explained in detail by the management.

Third, enlist the whole-hearted cooperation of all employees.

Fourth, a safety inspector must be appointed who has mechanical ability and the faculty of getting along with other men.

Fifth, the work must be followed up continuously and insistently.

Let us take up these five points in detail.

First, safety work must be organized. When I use the word "organized" I mean all that the word implies. It is not enough to have a safety committee, and inspector, and other outward requisites of a Safety Organization. It is not sufficient that the head of a concern give his permission to the starting of a safety organization and it does not suffice that his instructions are carried out in the establishment of the various committees unless this organization has the full support of the management. Each one of the various units and activities which constitute a real live safety organization must be coordinate before effective results are obtained. The safety department, because a department it should be, should interest the manager just as much as any

other department in his plant organization and as such it would be required that proper reports be laid before some executive at regular intervals showing what progress has been made in the way of plant improvements, in the way of educating employees and finally in the way of accident reduction. A safety organization not established along this line may do some good. Personally, I feel that any kind of organization does some good, but to accomplish the maximum results it is necessary to give the organized safety work full recognition as an integral part of the manufacturing organization.

SUPPORT OF MANAGEMENT ESSENTIAL

The question may be asked—what more can the head of a plant do than to give his approval and see that a suitable safety inspector is appointed and that committees are formed as required by the present-day organization plans? He can do this: He can by word of mouth at a meeting of the foremen impress upon them the importance of saving the life and limb of every employee of the plant. No other work that this executive could do would be more important, not only to the employees of that establishment but to the concern itself, whether you look at it from a monetary or a humanitarian point of view. He should emphasize in his discussion of the subject with the foremen that he is going to hold every one of them responsible not only for production in his particular department but also for the accidents that are caused by this production. If, in his discussion he also indicates that he intends to keep in touch with the safety movement through the various channels open to him and as time goes on indicates that he has kept in touch with the things that are going on in the plant, he will do much towards keeping alive the interest that the first meeting establishes. Every foreman will then have a message to deliver to the employees under his supervision. A typewritten announcement of the intention of the concern and soliciting the cooperation of every employee in the plant might advantageously be used by being posted conspicuously on bulletin boards in the plant. Such a letter should be signed by no less a person than the president of the concern or by some one recognized at the head of the local plant organization.

I can cite one particular incident affecting a very large concern. The buildings and machinery of this particular concern were practically 100% perfect as regards physical condition. All machines that were susceptible to guarding were guarded and the guards maintained, but still the accident experience was disastrous. A safety organization had been provided, but as far as effective work was concerned, it was of indifferent character.

It could be seen that the failure of the organization was the lack of personal interest in its work by the head of the concern. I interviewed him in an effort to sell to him his personal interest in the safety department. He said to me, "I have appointed committees and they are functioning. I have appointed a safety engineer. I have done all that I can, what more do you want?" I told him that I wanted his real

personal interest and his immediate reply was that he felt that he had given his personal interest when he had appointed the committees and spent the company's money on safety inspections. I then asked him as to whether or not he had ever called the committees together, together with all the foremen and superintendents in the plant, and addressed them personally on the subject of safety, informing them in no uncertain terms that he was deeply interested in safety work, that he was going to get behind it personally and financially, that he wanted the cooperation of every one of his assistants, that he was going to make it his personal business to see that accidents were stopped. He admitted that he had never taken sufficient interest in the matter to do this and my next question was a direct one—"Will you do it?" "If you take a real personal interest in the safety work in your plant, the organization will be an unqualified success. If you don't, it will never be a success." He agreed to do this. A meeting was immediately arranged and you may well believe that the attitude of the entire safety organization was changed in that plant from then on.

THE PERSONAL TOUCH THROUGH THE FOREMAN

Second, in the old days it was possible for the owner to know every workman by his first name. He knew something about the home affairs of John and Dick and Bill, and through his contact and his personal touch with the men, he often controlled conditions which today must of necessity be delegated to others. The man nearest approaching the old time employer who knew his employees so well is the foreman. The foreman, as a rule, is a man with recognized experience in conducting the work of his department. In the average plant, it is also necessary for the foreman to have another ability; namely, to understand men and get along with them. The influence of the average foreman over the employees under his supervision is seldom over-estimated. What better course could therefore be followed in starting a safety organization than to get the foremen together?

As a first step in this direction at this foremen's meeting, the subject might well be approached, not as a decided issue for them to follow out but rather as a matter that is up for discussion. Far better results are obtained where men are asked for an opinion as to the advisability of doing a certain thing rather than being told to do it. There is no question in my mind as to the decision of any representative body of foremen if the question is put up to them as to whether or not a safety organization should be established in a given plant. Through our organization, we have seen many instances where the subject has actually been put to vote, the results invariably being unanimous in favor of such activities. Assume, then, that the matter has been so presented to the foremen of any plant. Assume again, if you please, that their action has been favorable such as our experience would indicate. You can readily understand that the responsibility for the success of the organization has practically been transferred from the management to the foremen at this meeting. When I say transferred,

I do not mean that the management should shift the burden from their shoulders to the shoulders of the foremen, but there is a certain psychological effect in having the foremen in leaving the meeting feel that the safety organization has been established according to his wishes and that he is therefore in duty bound to support that organization and see that its objective is reached.

The next step would be the appointment of a committee of foremen to perform one of the duties as required by the Safety Organization plan generally recognized. This can be done either by the management, the superintendent, or, in my opinion, a still better plan is to let the foremen themselves elect their first representatives on the committee. It should be made clear to the foremen, however, that by process of rotation they will all eventually serve on this committee and some of them will perhaps be called to serve a second and perhaps a third time.

LEADERSHIP AND TEAM WORK

Third, cooperation of employees. During the world war, Kipling said that the war could not be won without "The team work of every bloomin' soul." The men must be taught to consider personal safety. You immediately say "Yes, but how can we teach them?" And, the first and most important answer is "personal experience," in other words, "practice what you preach." Most of us can remember that we have done things which we should not have done, yet, we all know by oral or by press reports or by plain sense that the very thing we did has caused accidents to others. The feeling that accidents happen to other people but not to me is a considerable factor in the cause of accidents. When the management make an effort to educate the men along safety lines and each man thinks that this applies to his neighbor and not to himself, he listens with little sympathy to a safety talk, but says to himself "Some of the boys have been having accidents lately and they had better be careful," but he refuses to accept the advice for himself. Few of us believe, unless it is instilled in us by some higher authority, that it is any of our business to look out for our neighbor as well as ourselves and help him to escape an accident. Perhaps the most effective way to reach the men is for them to realize that the head of the concern and all his immediate subordinates, including, of course, all the safety committees, are keeping their eyes and ears open and their wits sharpened, to be ready to help and to prevent accidents.

It seems almost inconceivable that an organization could exist in a plant and yet certain employees not know of it. Where such organizations exist, and I can assure you that they are many, one very important step in the organization plan has been overlooked. The main purpose of organizations for safety is to protect employees against the hazards of the industry. It is just as important to protect a man against his own carelessness as it is against the carelessness of others. In fact, it is even more important. If a safety movement in the plant will help to do this, what is more important than to acquaint the employee with the work which the management and foremen have decided to undertake?

How can the desired results be obtained without the employee—the patient as you might call him—or at least the subject of all these activities, knowing what is going on and lending his cooperation to the movement?

The failure of many organizations in my estimation is due to the fact that there is too much secrecy about what is going on inside so far as safety organization is concerned. It is not a secret society. It is intended for the workman, so take him into your confidence, tell him as much as possible about safety. Keep the subject before him constantly so that his ideas as to safe practice may be incorporated in the plan of the organization, as sooner or later you will need the practical man's viewpoint of every exposure. I do not mean to infer by this that the foreman is impractical, but I wish to leave the impression that the safety inspector who has been appointed may be very competent mechanically, but it is the man who lives with the job, who works with it day in and day out who actually knows the fine points that go forward toward making up the accident record. To get this suggestion from the workman, it is necessary that he knows what is going on, that he knows what the management is desirous of accomplishing through the safety organization of the plant, so be sure to tell him about it and keep telling him.

QUALIFICATIONS OF A SAFETY INSPECTOR

Fourth, it does not always follow because the man selected for the important position of safety inspector is a very competent mechanic that he is the proper man to take charge of the weekly inspection work of a plant. It requires more than mere mechanical ability. In the first place, the man must have one outstanding ability. He must be able to get along with his fellow employees, not necessarily by means of joking or being a good story teller—he must be more than this. He must have the respect of every man in the plant. He must be sympathetic, for if he is to receive suggestions of any value, he must listen to many ideas that are new to him and which at the moment appear to be absurd. It can readily be seen that if he ridiculed these suggestions making it apparent to the individual bringing them to his attention, he would not only lose the respect of that individual but would forever eliminate the possibility of receiving any further suggestions from him and possibly from any of his friends. His outstanding virtue should therefore be patience.

He must be analytical, as a good safety inspector will discover a hazard before it causes an accident. Any one can point to a hazard after there has been an accident. He must have inventive ability in order to overcome problems in guarding physical exposures. He must have foresight in order to avoid accidents that can be foreseen. All these qualifications and many are necessary in a good inspector, and you men who have come in contact with them know that I am not exaggerating actual qualifications of men whom you know personally. Yet many men who have very little in common with a man such as I

have just described are selected as safety inspectors. Is it any wonder, then, that the safety inspector does not succeed or does not in any event obtain the maximum benefits?

Another qualification which I have not mentioned at all is illustrated by the following incident which is taken from our personal experience. The inspector asked that a rail be placed at a point which he thought was particularly dangerous on a construction job. The superintendent on the job agreed to place a rail at that point "when he could get to it" but was unwilling to do it immediately. The superintendent was of the rough and ready type common in heavy building construction in larger cities and the inspector apparently lacked the nerve to be insistent that the rail be placed at once. Ten days later a man was killed at that point. There is no question but had the rail been installed the life of this man would have been saved.

KEEPING AT IT WINS

Fifth, following up continuously. The mortality of infant safety organizations is very high. While any new organized effort must be followed up, whether it refers to safety or anything else, it is particularly important in safety work to keep the enthusiasm that is created at the start constantly alive. One phase of safety organization work that is different from most other organization work is that once this enthusiasm has died, it is practically necessary to start the whole thing over again in order to make the organization a success. The management, therefore, has a very important duty in carrying out this fifth fundamental. It is important that some official make it a rule that the plant be inspected every week and that the weekly report be on his desk at a certain hour on a certain day. It is important that this executive sees that the safety committees meet on a given day and hour each month and that suitable records of these activities be brought to his attention at a predetermined time. A proper organization will charge the inspector with the posting of bulletins throughout the plant and see that these are changed regularly. It will charge this individual and sometimes the committee with the prompt investigation of every accident so that a record thereof may be incorporated in the minutes of the meeting and in the report that goes before the executive. The safety inspector and the community will share jointly the responsibility of arranging for periodical talks to employees, following up the maintenance department on compliance with approved recommendations. All of these are a part of the follow-up system which in order to get results must be on an organized basis so that each member of the committee, as well as the plant inspector, will know what is required of him.

MECHANICAL GUARDING SHOWS SINCERITY

While it is not necessary for a plant in order to start safety organization work to have every mechanical exposure guarded, it is evidence of the earnestness and seriousness with which the management has undertaken this work. It should be remembered, however, that organized

safety goes hand in hand with physical guarding of the plant. A real organization should develop recommendations for protection of mechanical exposures and in addition offer many valuable suggestions, of which experience can prove the necessity. In short, every employer should see that guarding of physical exposures is made an important part of the safety work of the organization during its first year as during that time most of the physical exposure should be taken care of.

One state recently gave consideration to the passing of a law which would require the establishing of a safety organization in every plant in the state. The growing tendency of state and federal authorities to pass laws regulating men in their action and their very living shows how important organized safety is considered by certain individuals. They have not, in my opinion, over-estimated the importance of organized safety work. How much better then is it to realize the importance of such activities and to make legislation along this line unnecessary by establishing a real active safety organization in every plant represented at this gathering?

EDUCATION THROUGH ORGANIZATION

We have found that safety organization work is the best means of approaching accident prevention in any plant. In fact, in some plants and for some type of accidents it is the only means of approach. I have reference particularly to plants where the mechanical equipment is light and where practically all accidents produced by miscellaneous hazards such as falling objects, slipping, tripping and cutting, resulting in scratches, bruises, etc. An analysis of many thousands of accidents has shown that the ratio of accidents of this kind is high. In some industries it runs as high as 90 per cent. Accidents of this kind cannot be prevented by the application of mechanical safeguards and the only way to control them at all, is through organized safety. It can readily be seen then that while mechanical guards will control or eliminate accidents on the individual exposure, the safety organization affects accidents of every description and cause, as even though a mechanical safeguard is applied it takes the safety organization to keep the guard in position and see that it is faithfully used by the employee. A safety organization's greatest field is in the large percentage of accident causes in every plant due to the miscellaneous hazards.

An interesting case showing the beneficial effect of safety organization work was called to our attention recently. A certain large woodworking plant employed a doctor to take care of their accidents, a very large number of which occurred every month. A safety organization was started a short time afterwards and unintentionally no mention was made of it to the doctor. The reduced number of accidents materially affected the work of the doctor who was engaged and he finally called on the head of the concern to find out whether or not some other surgeon had been employed. He then learned that an honest-to-goodness safety organization had been started, and that was why the accidents had been practically eliminated.

A MORAL OBLIGATION

Finally, the establishment of a safety organization gives the heads of concerns an opportunity to carry out certain moral obligations to the men. It gives them a tool whereby they can see to it that care is exercised in the preventing of accidents. A manufacturer who favors production above safety and who says that accidents are inherent to his business and must be assumed by the man who works on the job is no longer an up-to-date employer. A man is a responsible animal; he is the only responsible animal. The boy, as a youngster realizes the responsibility of protecting his sister. When the boy realizes his responsibility of kingship he then begins to realize his responsibility toward the man he works with. When you get down to the bottom, we are all one family. We are responsible for one another. But the tendency is for every man to do his own little bit of work, attend to his own business, run his own machine or his own automobile, absolutely indifferent to the welfare and safety of others. It behooves every manufacturer then to see that the men in his employ are given every opportunity to avoid the hazards of their work which not only includes the application of recognized safeguards for the mechanical exposures but the real live active organization, the purpose of which is to reduce industrial accidents to a minimum.

SAFE LAYOUT AND EQUIPMENT FOR THE
WOODWORKING PLANT

A. S. KURKJIAN, OLIVER MACHINERY COMPANY, GRAND RAPIDS, MICH.

The subject may be divided into two general headings: first, plant layout or building arrangement, and second, equipment or machinery for the manufacture and conveyance of the product in the plant, taking into consideration the layout of the building, the arrangement, the shape and the kind of plant conveyors according to the amount of production, the methods of growth and the geographical location of the plant.

PLANT LAYOUT

First, the main entrance should be level, without steps and with ample open space on either side of the entrance. You don't want your men to take any chances when entering or leaving the plant.

Second, wide aisles or passageways should lead to the different departments and these aisles should be marked on each side with white lines, to guide the men to walk automatically within those lines and to induce employees to keep their material out of that aisle.

Third, on inclines, stairs and slippery places, non-skid treads should be provided.

Fourth, passageways should be well lighted. This important factor in safety is often overlooked. I have seen many passageways in manufacturing plants where a person just entering could hardly see his way until his eyes became accustomed to the dim light.

Fifth, straight line progress or manufacture should be followed. Work out a schème whereby your raw material enters the factory at one end passing through each department in succession and emerges as the finished product at the other end. This plan is practicable if you have a one-floor factory. If the building has more than one floor devoted to the manufacturing process, the material in process should then pass to the second floor, working back to the original end and so on, through as many floors as are devoted to the production of the article. On any floors the material should move one way, forward. Many will regard this plan as an impossible ideal, but it can be accomplished by well-directed study and effort. Safer and more efficient production will be the result.

Sixth, the layout of all equipment and machinery should be such that there is no possibility of any machine being in the way of the operator of another machine. For example, if you have a hand planer and jointer in one location, see to it that no other machine is placed directly back of it or in front. In case of any accident in connection with this machine the man ahead or behind it will not get hurt.

Seventh, a sufficient number of lavatories and drinking fountains should be installed in the plant to prevent employees walking about more than is necessary. If men are kept in their own departments at work, or close to their departments, it will prevent many accidents due to walking back and forth.

Eighth, elevator shafts and chutes for the transportation of material from floor to floor should have automatic closing gates or doors. Stairways might be included here. Many a stairway is located so that the passer-by might accidentally fall through.

Ninth, in large plants several gates with time clocks should be provided to minimize the rush at the gates. There should be about one gate for every hundred employees.

Tenth, ample room should be allowed around each machine, not only for safe operation, but for the transportation of raw material and the disposal of the finished product from the machine. When you put in a machine, consider not only the floor space for the machine itself, but space for a fat employee who might operate it some day. Moreover there will be trucks going back and forth past the machine.

Eleventh, for each floor or department a wide central aisle with the machinery on either side is generally preferable to placing the machinery in the center with a narrower aisle on each side.

Twelfth, first aid stations should be provided for each department with approved first aid equipment and supplies. Often it is a difficult job to find the box and then to find the man who has the key. In laying out the plant, provision should be made for first aid stations near each of the main departments.

PLANT EQUIPMENT

Transportation in most woodworking plants is done by trucks. Be sure no truck in your plant is overloaded and no truck has projecting handles or sides which drop down and cause a man to trip over them.

If possible, use trucks that will not be self-starting with a load if they happen to be placed on a floor with a slight incline. A new truck, known as the elevator truck, is being introduced in many of the larger plants. With it the load of lumber can be taken to the machine, a double surface planer for example. The operator takes the boards from the truck and feeds them to the machine. As it comes out of the machine, it is picked up by the helper and placed on another truck. The elevator on the first truck raises as the lumber is taken from it and the one at the other end lowers as the planed boards are loaded, keeping both trucks at the level of the machine. With this equipment there is no danger of a pile of lumber dropping on some one.

The term "working equipment" is applied to everything used in the transformation of the raw lumber to the finished product—cutting, planing, shaping, moulding, routing, mortising, tenoning, boring, clamping, gluing, sanding, finishing, etc.—all machines which operate on any part of the raw material through to its finished product state.

There are three varieties of guards for the "working equipment" of any woodworking plant; first, the safe shape of the operating or cutting unit; second, guards which serve as a warning to the operator and, third, guards for the appurtenances of the machine.

An example of the first type is the circular safety cylinder head, which was introduced in 1908. The introduction of this type of cutting head has done much for the prevention of accidents and even now it is regarded as the best guard imaginable. The old square heads should be discarded, no matter how much old employees may praise them.

The next type of guard is that of a warning to the operator. These are recommended by insurance companies and safety commissions, but are objected to by managers who say, "What is the use of my buying it? The man won't use it." That objection is not tenable. If the manager is a big enough man for his job, the workmen will use the guard. Present day guards, however, do not interfere with production and many a worker does not realize that they are on the machine; hence you should insist on having all of your machines equipped with "warning guards."

"Guards for the appurtenances" consist of guards for the belt and pulley, the countershaft and other equipment for power transmission. This problem is of minor importance because the up-to-date woodworking plant is going to be a beltless plant. There is scarcely a manufacturer of woodworking machinery who is not actively interested in building safety into his equipment, and this means the elimination of the ordinary power plant. From the safety consideration, we have the generator to take the place of the old Corliss engine. Electric wires take the place of belts. Push button control is succeeding the belt shifter. Climbing a ladder to oil or lubricate shafting is becoming a thing of the past.

THURSDAY MORNING SESSION

Chairman Paine: The first speaker on the program will be Sherwood Brockwell, of the State Insurance Department, Raleigh, North Carolina.

FIRE PROTECTION IN LUMBER YARDS AND WOODWORKING PLANTS

SHERWOOD BROCKWELL, STATE INSURANCE DEPARTMENT, RALEIGH, N. C.

During the month of August the total loss by fire of the state of North Carolina was \$81,000 and that was the lowest fire loss for a month we had had in 22 years. All our papers spoke of fire prevention being a success in North Carolina because the fire loss for that month was only \$81,000. There was one lumber loss amounting to \$29,000 and three other lumber fires bringing the total up to \$36,000 out of the \$81,000.

You can't have a woodworking plant except you have a very high fire risk. You have got to have your shavings. You have got to have your dust. You have got to have your material, and a great majority of the factories throughout the country are now using veneer, which burns like tissue paper. It is no use to depend on the city fire department. Plants are often located in a small town which has a limited amount of fire protection. By the time you have turned in your fire alarm and the fire department has mobilized and reached your plant and started to work the fire among this highly flammable material has reached a point where your fire department can not effectively fight it.

I have been for 21 years a fireman myself. My advice to you, and I am not connected with any sprinkler concern in the world, is; don't depend on your fire department, don't depend on your plant department, but have that furniture plant or woodworking plant equipped with sprinklers, because it is a very good investment, and it insures every man's job in there. You can't use the ordinary fire protection around a woodworking plant in the South, because the average worker there is not the kind of man who has the interest of the plant at heart. He listens for the whistle to blow.

REDUCING THE COST OF "POINT OF OPERATION" ACCIDENTS

**H. G. WIBERG, CHIEF ENGINEER AND UNDERWRITER, LUMBER MUTUAL
CASUALTY INSURANCE COMPANY, OF NEW YORK, NEW YORK CITY**

This means that insurance engineers, in recommending the installation of safeguards can inform the employer or his representative that the amount of rate reduction he will obtain for a certain hazard so guarded reflects the proportion of the total losses in his industry that the particular hazard in question has actually been found to cause. Employers have often questioned the propriety of values assigned to items in previous schedules and in the absence of statistical data to back up those values, the explanation was not always satisfactory. In addition, the new schedule, because of its statistical foundation, will be of great value through the stimulus and accurate guidance given to accident prevention work.

While I am not here to discuss in any detail this new system, which is called the Industrial Compensation Rating Schedule—1923, it is necessary for the purpose of my talk to indicate briefly and in general the method used to measure the accident hazards of the individual plant.

The schedule is prepared by comparing the guarded conditions of the individual plant with the average guarded conditions of all plants in the industry. We have determined the average guarded conditions from the indications of approximately 30,000 inspection reports covering a large part of the country. The data, therefore, covers a broad exposure and does not simply reflect conditions peculiar to one locality or one state. Then from the loss and cause data, we have determined the proportion of the total losses (and that corresponds to the proportion of the rates), which each item of the schedule, such as elevators, transmission, machine driving devices, other machine parts and point of operation has caused.

Thus, we know two things—(1) the average amount of guarding for any hazard in each industry, and (2) the amount of rate represented by that hazard. These might appropriately be termed "The Standards of Comparison."

Next, by actual inspection, the guarded condition of the particular plant being rated is determined. If that plant is found to be guarded to the same extent as the average of all plants, then the amount of rate for such a plant is the same as the standard amount of rate assigned to each item, as determined from the loss cost data. In other words, being the same as the average plant, the average rate applies. If, however, the plant is better guarded than the average, then the amount of rate assigned is less than the standard amount for each item in accordance with the proportion that it is guarded better than the average. Conversely, if it is not guarded as well as the average, then the rate cost assigned for each item is proportionately increased above the standard amount for each item of hazard.

These standard amounts of rate cost for the different hazards covered by the schedule vary greatly and naturally the greatest one indicates the best point of attack to prevent accidents, reduce losses and in that way, reduce the rates. Using the indication in that way, guess work is eliminated and the greatest rate effect obtained in the quickest way and with least expenditure. The spot light is thrown directly on the very heart of the problem.

POINT OF OPERATION HAS HIGHEST RATE PERCENTAGE

The highest rate cost percentages are assigned to the point of operation hazard. By point of operation, we mean that place or part on the machine where the stock is put through. Depending on the machine and industry, it may be a sawing operation, moulding operation, metal stamping operation, metal drawing operation, calendering operation, and a host of others. And while the highest values are found in the case of the point of operation item for all industries, they are particularly and notably high in the case of the woodworking industry. In that industry, on a total loss cost of almost \$1,000,000.00, the point of operation accidents alone account for 44.8 per cent of the total.

Out of the same total cost of almost \$1,000,000 for all accidents in the industry, those due to all transmission conditions; such as belts, chains,

ropes, gears, friction drives, and so on, amount to only 3.1 per cent. I mention this fact to show by comparison, the importance and significance to us of the point of operation hazard.

Those two items account for approximately 50 per cent of the total loss cost. Of the remainder, over 40 per cent represents, in the main, the kind of accidents which cannot be prevented by mechanical safeguards, accidents which are governed and controlled almost entirely by the employees and actions of the worker himself. Such accidents can only be prevented by education. In addition, this remainder or residue, as it is termed, also includes some accidents due to mechanical causes. The losses caused are, however, so infinitesimal in amount that they do not merit individual consideration, amounts for instance, such as 1/10 of one per cent and less of the total losses.

That leaves approximately 10 per cent which is allocated to several items, such as elevators, driving mechanisms of machines, moving parts of machines excluding point of operation, eye protection and so on.

Now the figure of 44.8 per cent is the average for all woodworking industries. What are the figures for the principal types of woodworking plants? In connection with the figures which I will give, it is interesting to note the proportion of the cost of all accidents on machines which the point of operation alone represents.

First, we will take sash, door, blind and interior trim mills. The point of operation alone caused 60 per cent of the total loss cost in the industry—more than half, and of the losses occurring on all parts of machines, the point of operation amounted to 86 per cent of the total.

In the case of planing and moulding mills, the figures are 44 per cent of the total losses in the industry for point of operation and 96 per cent of all the machine accidents.

The furniture manufacturing figures are 53 per cent and 97 per cent respectively.

Coming to another broad spread industry, box manufacturing, we find 57 per cent and 87 per cent for the two figures.

Piano manufacturing, a refined woodworking operation, developed figures of 45 per cent and 98 per cent respectively.

I should perhaps point-out at this point that none of the losses for these industries include sawmill operations. They are always separated. For saw mills alone the figures are 42 per cent and 88 per cent.

These figures, I think you will agree, convincingly set up and establish the point of operation hazard as the greatest single accident producing factor in woodworking plants. Naturally, in building a system for measuring the accident hazards in those plants, the insurance companies had to allocate a large proportion of the rate to this factor. They reasoned that if the serious losses are caused by this item, their elimination or the reduction of these hazards in the individual plant must eliminate accidents and a large part of the loss cost. Following that reasoning to its natural conclusion, the plant that does guard that dangerous point

is distinctly better than the average and, therefore, entitled to a much better rate than the average plant. The schedule is accordingly arranged to give large rate reductions for plants with the point of operation well guarded.

The provision of point of operation guards has another far reaching effect on rates. The rating system now in existence in almost every compensation state, includes a method of rate modification, which is termed, "Experience Rating." That may be briefly described as a comparison of the accident loss cost of the individual plant with the average for the industry. Where the loss cost is lower than the average, that plant obtains a reduction of the rate which has been established by the measurement of the physical plant hazard. Where that loss cost is higher, the plant rate is increased. Of course, the more favorable the divergence from the average, the greater the reduction.

Therefore, the employer who guards his point of operation, in accordance with the standards of the schedule, will receive a substantial reduction in his plant rate for doing that. That safeguarding is going to bring his loss cost below the average, securing him another substantial credit from his plant rate credit. On the other hand, lack of such safety work increases the plant rate above the average and the lack of guarding causes the loss cost to run above the average, so that the increased rate for plant conditions is again increased.

In other words, safeguarding the point of operation safeguards the rates, or what is the same thing, of course the premiums, by the two greatest factors which can affect it. It is obvious, therefore, that it is distinctly worth while for woodworking plants to concentrate and specialize on the point of operation.

RATING OF PLANTS

Let us get right down to the practical side of the proposition by considering a specific case or two. I have in mind one which came to my attention recently and which represents the rating of a plant in operation in New Jersey, manufacturing furniture.

This plant has 43 machines. Now the schedule differentiates between the different types of machines in the order of their hazard, assigning a certain weight to each one to represent the hazard when totally unguarded. The order of hazard was determined from the analysis of loss cost data previously mentioned which showed the first three in order of danger to be circular saws, jointers and band saws. It then assigns a weight to each machine to represent the amount of hazard removed by guarding it. The difference between these two weights represents a certain amount of hazard, which I think you will agree, is present even after being guarded due to various causes, such as failure to use the guard at times, accidents while setting up when, of course, guard can not be used and inability to use the guard at times because of special nature or size of stock. Some machines are considered to have two points of operation, where, for instance, two operators can work at the same time. Such a

machine is a shaper. In this plant there are a couple of such machines, so that the number of points of operation is 45, although there are forty-three machines.

These respective weights were assigned in this plant and it was found that the total weight of the machines unguarded was 140 points. The weighted value of the hazard removed by guards actually installed was zero, because there were no guards. The difference between these two values, namely, 140, divided by the number of points of operation, 45, and this quotient multiplied by the value assigned to the point of operation in this industry—namely, 25.2 per cent, results in a figure of 78.4. That is the percentage of the rate for this plant represented by the point of operation hazard as the plant stands.

Now suppose that all of the machines were guarded. Then the weighed value removed by guarding would be 69 and the point of operation part of the rate would be represented by the figure 39.8. This is obtained by subtracting 69, the weight removed by guarding, from 140, the total unguarded weight, dividing by the number of points of operation, 45, and multiplying by the value assigned to this item; namely, 25.2. That is, if all the points of operation were guarded, the rate value for that section would be 39.8 per cent instead of 78.4 per cent. Guarding the point of operation, therefore, would reduce the rate for this plant 38.6 per cent, and as the average or manual rate for furniture manufacturing in New Jersey is practically \$1.50, this plant will pay 38 per cent of \$1.50 or 57c more than if they guarded the point of operation. On a payroll of \$30,000.00 per year, that means an additional premium of \$150.00 a year.

And the experience backed up the plant conditions, as there is a charge of 17 per cent for that rating. The record shows two serious accidents which are without much question dismemberments occurring at the point of operation. I cannot state that positively, because the accidents occurred during the coverage of another insurance company.

The combined effect of plant rating and experience rating increases the average rate 76 cents or almost exactly 50 per cent.

Just the reverse of this situation is presented by a large box manufacturing plant in the State of New York. The majority of their machines have the points of operation guarded and they have been for some time. The experience of the plant or their previous accident record, has reflected the prevention of accidents, due to their guarding. The combined result is a rate and a premium, which is exactly 40 per cent of the average or manual rate. That plant has a payroll of about \$200,000 a year. The manual rate is 4.5 per cent, so that they are saving annually the sum of \$5,400.00, obtained as follows: The premium at the average rate of 4.5 per cent per \$100.00 of payroll would be 2,000 times \$4.50 or \$9,000.00. Their rate is 60 per cent below, so that they save 60 per cent of \$9,000.00 or \$5,400.00. That ought to buy a number of guards, pay for the time of someone to follow up the safety work and leave a worth while sum over.

Now what about these figures? What do they mean? To me they represent a challenge to the woodworking industry. Employers are com-

plaining of the cost of insurance and in many cases of compensation and employer's liability insurance in particular. Do not these figures point to a clear and definite method of reducing materially that item of overhead? Statistics indicate that the premium in New York State alone for woodworking plants amounts to over \$1,000,000 a year. If all of the wood workers were to get together, they could reduce the overhead by 30 per cent, as a conservative figure that would be a saving of \$300,000 per year for them.

These figures should stimulate the safety engineer, the manufacturer of safety devices and the concerns placing those devices on the market. The important savings that can be made will secure for the safety engineer the interest and attention of the employer. The same consideration will add great force to the selling argument of the guard manufacturers and dealers.

And finally the employee. He will, as a result of the new and enlarged importance of the point of operation hazard, be called on more and more to use guards for that point of the machine hazard. To save himself immeasurable pain and humiliation—the result of accidents—he should cooperate and use every practical and effective guard provided. Employees' organizations may well advise their members to cooperate in that way, as one of their avowed purposes is to provide and secure safe-working places for the workman.

The methods of actually securing the installation of these points of operation guards and thus obtaining the much desired reduction in insurance cost and the prevention of accidents, do not come within the scope of this discussion, but I do want to say that it is possible to guard practically the entire point of operation hazard in our woodworking plants. It has been done in more than one. The attainment of that situation generally, appears to me to depend on the active interest and cooperation of the employer, the ingenuity and persistence of the safety engineer, the education, interest and application of the present day workmen, and finally, the training and direction of the coming generation of workers so that the use of safeguards will be an ingrained habit, and second nature with them every moment of their working time.

DISCUSSION

Mr. G. H. Pearce (William Heinrich's Sons Co., Buffalo, N. Y.): How can you guard the point of operation on the saw doing cross-cutting when the saw travels and the table travels? Will it give you credit if you put a splitter back of the saw, or must you guard the saw too?

Mr. Wiberg: That brings up a question which has often been brought up, that is, the proposition of a partial credit. That would be almost entirely a matter of judgment, and one in which there would be great conflict between the engineer who considers the question and the people who would be invited to participate in that consideration. It would complicate immensely the work of inspection of plants and also the rating of plants. We may get to that some time when we can get statistics for indicating the accidents that occur on saws which have a partial guard,

such as those suggested by Mr. Pearce, the accidents which occur on saws that have a complete guard, and the accidents which occur on saws that have not any guard whatever. Until we get a fund of information of that character, it will be almost impossible to assign any partial credits with any reasonable degree of accuracy.

Mr. Jones (Surety Guard Co.): I run against this in my every-day work, more especially in the small plants. It is in connection with a guard which we class semi-automatic, which has to be raised and set to accommodate the various thicknesses of the material. If a man is running a certain thickness he sets it at one inch or an inch and one-eighth. That automatically raises and lowers and he gets as good a rating as a full rating guard. I find that in a lot of cases where the semi-automatic guard is raised up for some particular job, probably six inches above the saw or above the table, it remains in that position. The man goes away and leaves that saw. Another man comes along with probably a one-inch board to cut off. He does not take the time to lower that guard, and a serious accident happens, or is liable to happen. In other words, he can pass his hand right through underneath that guard and cut a whole hand off. Will that class of guard get as good a rate of insurance as one that automatically rides on the material, raises and lowers automatically?

Mr. Wiberg: That presents another aspect. According to my recollection, the standard requires that the guard shall be in contact with work at all times. I should say that if the guard is adjusted so that it is kept in contact with the work at all times that would meet the requirements.

Chairman Paine: As it is necessary for me to leave to go to another session, I will ask Mr. Sanford to take the chair.

(Mr. Sanford took the chair.)

TRAINING MACHINE OPERATORS IN SAFE METHODS

M. C. GOODSPEED, GENERAL ELECTRIC COMPANY, ERIE, PA.

Where do you begin in this matter of training the operator? You must begin at the top. The operator must be influenced by his superintendent and by his foreman. You must begin by training the superintendent and the foreman.

Having trained the leaders and secured the trained leadership, the next question is the personnel. So far as possible you should select men who are capable of being trained for the work they are to do. That causes you to analyze the job on which the man is to be placed. You should not place a slow man in a job which requires quick thinking. You can place the slow man on the job which does not require this quick action.

It seems to me that one of the largest problems which should be considered is the danger surrounding each individual operator, calling his attention to those points which affect his particular job. The operator on a saw does not need to know the danger of operating a punching

press, and vice versa. In connection with the training of the man you should impress upon him the need for safety as well as the need for getting the finished product out.

There are hundreds of possible causes of accidents, but every individual operator in this plant is probably subject during his day's work to only two or three or half a dozen of these probable causes. Therefore, it seems to me that one of the largest problems which should be considered is the danger surrounding each individual operator and calling his attention to those points. In connection with the training of the man, the danger surrounding his own particular job should be pointed out and impressed upon him. At the same time, do not forget that in addition to his job there are always the accidents in regard to the stairways, exits, etc., in regard to which the plant as a whole must be trained. I am assuming that you have a new man to be educated in the ways of your plant.

You must be everlastingly following up your work. Because you have told a man what he should do today does not mean that you must not go back to him continuously and point out the statement which you have previously made. He either forgets it, or through indifference or neglect does not carry out these directions oftentimes. In either case, the getting of a safety habit across with those older fellows is often a matter of constant repetition.

Another thing I believe you should consider and that is to know the home conditions of your employee. The employee is influenced by his home conditions. He is influenced by the thought, the attitude, of his children and his wife. Therefore, in spending time and money in seeing that safety is put across from the standpoint of the home, you are educating your employee to think and act safely. More than that, the children of today are the employees of tomorrow, and if they have this impressed upon them as children they will retain it as employees.

REPORT OF NOMINATING COMMITTEE

Mr. Wiberg: The nominating committee desires to present the following names:

Mr. G. E. Sanford, chairman;

Mr. E. Ross Farra, vice-chairman;

H. G. Wiberg, secretary.

(Motion made, seconded and carried to accept the report.)

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